FLIGHT & The AIRCRAFT ENGINEER.

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

No. 477. (No. 7, Vol. X.) FEBRUARY 14, 1918. [Weekly, Price 3d. Post Free, 4d.

Flight.

and The Aircraft Engineer.

Editorial Office: 36, GREAT QUEEN STREET, KINGSWAY, W.C. 2.

Telegrams: Truditur, Westcent, London. Telephone: Gerrard 1828.

Annual Subscription Rates, Post Free.

United Kingdom ... 15s. 2d. Abroad... ... .. 20s. 0d.

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NOTICE OF REMOVAL.

The Offices—Editorial and Advertisement—of "FLIGHT and The Aircraft Engineer" are now at

36, GREAT QUEEN STREET, KINGSWAY, W.C. 2.

Telephone No.: Gerrard 1828.

Teleg. Address: "Truditur, Westcent, London."

EDITORIAL COMMENT.

"Newspapers are an essential part of our war organisation."— (*Sir Auckland Geddes, Minister of National Service.*)

ONE of the most remarkable aspects of the present phase of the war in the West is the great successes of Allied airmen over those of the enemy. Not only in France and Flanders has this sequence of successes been recorded, but it has been the same on the Italian front, where the enemy's losses in aircraft have been, during the past month, far in excess of those of the Allies. There must be an explanation of this, but it is not altogether easy to arrive at. We know that individually, excepting in the few cases where the enemy's "star turns" are concerned, the Allied airmen are distinctly superior in dash and skill to the Germans, so that given anything like equality of machines and numbers we should expect the balance to be on the side of the Allies. But the balance of success has recently swung so much to our side that it is clear there is some factor operating that has hitherto been absent. There are two possible explanations. The one is that at long last the construction programme of the Allied nations is beginning to tell its tale and we are in process of securing that definite superiority in numbers and resources at which we have been aiming ever since the start of the war. The other is that the enemy is exercising a strict economy of machines and is doing no more flying than circumstances compel. At first sight this would appear to connote smaller relative losses than normal, whereas the tendency has been to increase them. But it must be remembered that if the Hun is in fact saving his machines for future use, the few that he does send over the lines have to rely on themselves to get out of trouble. The machine that is sent out on photographic reconnaissance, for example, cannot any longer depend upon a flight of fighting machines coming to the rescue if it has the bad luck to be overhauled and engaged by British or French aircraft. The natural consequence is that the unlucky Hun machine becomes a comparatively easy victim and figures one in the list of losses without a corresponding balance to offset it.

Allied Air Superiority.

The question is, to which of the two causes noted is the present run of aerial success on the side of the Allies due? We ourselves are strongly inclined to the opinion that it is to the second and that the enemy is in fact saving his machines for the vital work that lies before them prior to, and during, the great offensive for which we are waiting. For although there are no present signs of the threatened blow falling in the immediate future, there seems to be little doubt that the German Command has decided to put fortune to the test of a last desperate attempt to secure a favourable decision of the war in the West. Everything points that way. The great troop movements reported from Belgium; the shifting of divisions from East to West; and the appearance of Austrian batteries behind the enemy lines; all these serve to indicate that before long there will be an end to the present state of calm along the front, which is really only the prelude to the greatest clash of arms the world has ever seen. Moreover, we know that for every reason, military, political, and economic, a

great victory in the West is absolutely necessary for Germany in the immediate future, and the longer the stroke is delayed the worse become the prospects of success. As a matter of fact, even the present prospects for a successful German offensive are the reverse of encouraging to the enemy. So far from his boasted reinforcements from the Russian front having enabled him to redress the numerical balance against him, they have not even equalised it. At the present moment, the combined Franco-British armies are still slightly superior in numbers and in guns, leaving out of account altogether the American, Belgian, and Portuguese forces in the line or in reserve in France. More than that, Germany has no more reserves at her disposal. Her industries have been combed out not once but a dozen times and are milked dry. All she can look forward to are her annual classes of youths, and even these are mortgaged up to the end of 1920! That is to say, whatever may have been the case in the earlier years of the war, when certain of the prophets assured us that Germany was at the end of her man-power resources, it is beyond doubt that she has drawn her very last man into the line and must stand or fall with what she has now. It hardly needs saying that this does not by any means indicate that we can afford the very smallest slackening of effort. On the contrary, Germany is faced with her final effort. If she succeeds, then we must needs make the best of a German peace. If she fails—and she *must* fail if we put forth our best effort—then the end is equally in sight, but it will be the end *we* desire and have been fighting for these three-and-a-half years past.

When at last the German Command decides that the time has come to launch the great offensive, it will necessarily be preceded by an intense battle for local supremacy in the air. Only when this has been obtained has a great attacking operation any real chance of success, for the reasons that are perfectly well known and appreciated by our readers. It follows, therefore, that it is literally true to say that the success or failure of the campaigns of 1918 is being decided in the aircraft factories of the Allied nations. We know the enemy has been concentrating a tremendous effort on aircraft construction in preparation for the coming Spring. In addition, it seems clear that he is saving every machine he can spare from all but the most essential work at the front. The question, then, that only the next few weeks can answer is: Has our own rate of construction been high enough to give us not only equality but a sufficient margin over the German aircraft strength to hold and defeat the preliminary aerial offensive? Obviously, we cannot answer the query—we can only hope.

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Trade Union Methods and Production.

Closely allied to this question of aerial supremacy—inseparable from it, indeed—is that of output in our factories. There has recently been a deplorable misunderstanding between certain of the Government Departments concerned and a section of aeroplane workers, a misunderstanding which we are glad to say did not result in a stoppage of work. It is quite possible that these misunderstandings are inevitable in the circumstances existing at present, and that the best we can expect is that they should be adjusted with the minimum of delay and by the adoption of a policy of give and take on both sides. In themselves they are sufficiently serious, and their effect on output of aircraft is pernicious, but at least they have the merit of being open and of thus affording a clear basis for discussion and adjustment before lasting harm is done. There is, however, a much greater peril at the door and it is all the greater because it is insidious. We refer to the trade union restrictions on the output of operatives engaged on piecework. Now, it is a fact, so we are assured by quite competent authorities, that the piece-workers on aircraft work are at the present moment working to no more, as a general rule, than sixty per cent. of their capacity, which means, of course, that where we should produce a hundred machines in a given time we actually only produce sixty. To put it in another way, to meet the coming German offensive in the air we shall be forty per cent.—nearly half—short of the number of machines we might have had if our aircraft workers had really put their backs into the task of giving us that aerial supremacy which will make all the difference between victory and defeat. It is a sorry reflection indeed that our gallant fighting men at the front, to say nothing of our civilians—men, women and children—who are exposed to the dangers of enemy air raids, should be denied by trade union rules, which are indefensible even in times of peace but which are absolute treason in time of war, the necessary numbers of aircraft to enable them to carry the war to an early and victorious end. It is unfortunate that there does not seem to exist a remedy for this state of affairs, other than an appeal to the patriotism and good sense of those who are responsible for making these pernicious rules. Of the effect of such appeals we confess we are not at all sanguine. They have been made time and again during the war, but still the damnable system of restricting output continues with the results we have stated. There is but one thing remaining to be said—that the men who are fighting our battles overseas will know their friends when they return.

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Hun Propaganda from the Air.

Last week we commented on the case of Captain Scholtz and Lieutenant Wookey, who have been sentenced to penal servitude for ten years by the Huns for the "crime" of dropping propaganda leaflets behind the German lines. As we noted at the time, we are more than pleased to know that our Government has taken prompt action by demanding the release from prison of these two officers, threatening reprisals if the demand is not complied with at once. It does not appear to have been alleged that the leaflets which were the subject of the charge contained anything but the truth—which, of course, is the last thing in the world the German authorities desire their people to know—and, knowing our own methods, we should be very astonished indeed to hear that they did in fact contain any statements which were not literally true. We have no official knowledge of their exact text, but it may be accepted that they were made up from the speeches of President Wilson and the British Prime Minister. But whatever they were, or whatever they contained, the Hun took such a serious view of them that the officers concerned in their distribution were given a savage sentence of penal servitude for doing what they had no alternative but to do without disobedience of orders. The mentality of the Hun is past appreciation. We cannot get at the point

ON THE WESTERN FRONT.—Livening up the Hun trenches. A bull's-eye.

from which he begins his line of reasoning, so that it is quite impossible to see how he arrives at his conclusions. Nor does that particularly matter. Very few of us know anything much about the habits of the polecat. We know it to be a filthy, smelly beast and there our interest in it ends. It is the same with the Hun—except that he is rather worse than the polecat—and his particular form of psychology interests us not at all except by reason of its contradiction that all he does must be good, but that everything done by his enemy must of necessity be bad.

It is impossible to avoid this reflection when we read of the sort of propaganda literature that is being distributed by enemy airmen, particularly on the Italian front. In a despatch to *The Times* from Italy, a correspondent says that "enemy airmen continue to drop leaflets and pamphlets in the Italian lines. One of these pamphlets has an illustrated cover showing a British soldier bayonetting an emblematic figure of Italy, who is falling on a map of Italy, while a British officer seated upon Rome brandishes a revolver. In the text it is declared that the English will burn Milan and Turin as they burned Salonica (*sic*). On the cover of another pamphlet the British and French sectors are marked, 'Quiet Zone,' but over the Italian sector is written, 'Zone of fierce Austrian attacks and the zone where the Italians shed their blood.'

"The burden of these efforts is that the Italian Army has to bear the whole brunt of the battle and that the Allies have an easy time. All this nonsense is cleverly enough dressed up in a fashion to impress the minds of peasant soldiers. The illustrations are no doubt intended for those who cannot read."

To the mind of the Hun it is doubtless quite right and proper and perfectly legitimate war to drop broadcast this sort of lying propaganda, but it becomes one of the most serious of crimes when truthful accounts of the utterances of Allied statesmen are distributed among his own people. It is pretty certain that if we gave notice that we should treat as ordinary prisoners of war airmen captured in possession of truthful propaganda literature—assuming the Hun *can* tell the truth—but that the dropping of such offensive literature (!) as that described above would entail the shooting or sentencing to long terms of imprisonment of the airmen concerned, there would be a howl of pious horror at our barbarity (!) and we should be held to be outside the pale of civilised peoples. Let us say at once that we do not ask that any such punishments should be imposed upon men who are only doing their duty according to the orders they receive. It is even distasteful to demand reprisals on those who have had no active part in the trial or sentencing of our own officers who have been unfortunate enough to fall into enemy hands. Were there any other way out we should be glad to take it—as we should in the case of air raids on open towns—but unfortunately there is not. It is hard luck on the victims of these reprisals, but the fault does not lie with us. The account is due to be paid by the German Government, which has always had one law for itself and a directly opposite code for its enemies or for those who are so unfortunate as to be beneath its heel for the time being.

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The Curative Value of Colour.

We confess to more than a passing interest in Mr. Kemp Prossor's ideas of the curative value of colour in the treatment of nervous disorders—shell-shock, for example. Briefly, the theory is that certain colours produce certain effects on the mental system and if the patient who is suffering from shock is brought into contact with hostile colours, such as cardinal red or brown, the result will be a mental disturbance which will greatly retard recovery. If, on the other hand, the patient is surrounded by sympathetic colours an entirely opposite effect will be produced and recovery accelerated. There is undoubtedly a great deal in this theory of colour-cure. We know, for instance, that red has a valuable effect on smallpox patients and we are also familiar with the cure of lupus and similar diseases by the aid of the ultra-violet rays, so that there is no inherent improbability in the theory that the colour treatment can be extended farther afield with beneficent results. Apart altogether from theory and the known effects to which reference has been made, most of us are affected in more or less degree by our colour surroundings. Certain blues, for example, have a most depressing effect on some subjects while the brighter shades of the same colour have an opposite effect. Orange, again, is mentally stimulating to some people, while some reds are capable of making certain subjects into potential murderers. The list might be continued almost indefinitely, but we are confident that most of our readers will be able, out of their own experience, to supply examples of the effects of colour surroundings on the subject.

With the approval of the War Office, the colour cure for shell-shock patients has been tried in the McCaul Hospital for Officers in Welbeck Street with, we are told, excellent results. The point that suggests itself to us is that the war has produced other nervous affections than those resulting from shell-shock. After a long period of active service flying many of our airmen suffer from nervous affections which entail long terms of hospital treatment and it seems to us that if the colour cure is so successful in the one class of cases it is surely worth trying in others, particularly as it costs nothing but the very nominal outlay on the necessary paints to turn the ordinary hospital ward into a room similar to the experimental ward at the McCaul Hospital. Even if the War Office is not prepared to go all out on the scheme, there are certain private hospitals and homes in which officers of the flying services are undergoing treatment for nervous affections in which the new cure-by-colour might well be given a trial. We understand that Mr. Kemp Prossor, who has worked out the theory of sympathetic colours, is prepared to give every assistance in its development without any charge whatever, which may be an additional incentive to some of our hospital authorities to give the system a trial. But every other consideration apart, we simply cannot afford to ignore any method of treatment, or any theory which can be seen to rest on anything like a basis of ascertained fact, which promises to assist in the alleviation of the terrible toll of nervous disorders the war is taking from the officers and men of our fighting services. Environment is almost everything in these cases, as we know, and after all colour schemes are simply modifications of environment. For our own part, we are fully convinced that the Kemp Prossor theory is one that has a great deal of sound reason behind it.

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Death of Lord Rothermere's Eldest Son.

It is with sincere regret that we have to record elsewhere in this issue the death of Captain the Hon. Harold A. Vyvyan St. George Harmsworth, M.C., the eldest son of Lord Rothermere, the Air Minister. This loss is the more grievous, since about eighteen months ago, Lord Rothermere's second son, the Hon. Vere Harmsworth, R.N.V.R., met his death whilst serving with the R.N.V.R.

FLIGHT

"A POST-WAR AEROPLANE."

By F. W. HALLIWELL, A.M.I.E.

(*Concluded from page 151.*)

"Points Affecting Aerodynamical Efficiency."

SPEAKING broadly, the aim of the designer is to obtain efficiency, that is, to be able to carry the maximum load over a given distance with the least expenditure of energy.

For fighting machines two points only are of primary importance, *e.g.*, speed and rate of climb. Unfortunately, the essentials for these two are diametrically opposed to one another inasmuch as the first requirement for maximum climb is low velocity in order to secure the best lift/drift ratio. Since both of these are desirable characteristics in the majority of machines, it will be seen that the solution of the first problem must be in the nature of a compromise.

Considering an aeroplane in horizontal flight, the necessary conditions of equilibrium are maintained by balancing the forces acting upon it. The two which have to be overcome in order to obtain flight are W, the weight of the machine acting vertically downwards, and R, the total resistance of the machine to forward motion. W is balanced by L, the "lift" of the wings, and R is balanced by T, the thrust of the propeller. It will be seen, therefore, that if we wish to better the performance of any machine we must reduce either W or R. Whatever the purpose of the machine the reduction of head resistance, or more correctly "drift," is of great importance.

The total drift of an aeroplane may be conveniently divided into two parts. Firstly, the drift produced by lifting surfaces, *i.e.*, the wings; secondly, the drift produced by detrimental surfaces, such as fuselage, struts, under-carriage, &c.

Once the wing section is fixed, the resistance of the wings cannot be reduced, and being a component part of the reaction, increases as the square of the velocity (approx.), as does the lift; so the efficiency of the wings remains the same at all speeds.

The drift, due to detrimental surfaces, however, also increases as the square of the velocity (approx.) without any attendant increase in lift; thus it will be seen that any means of decreasing the detrimental surface or drift due to same is of great value, more especially so in high speed machines.

In a machine of orthodox design about 50 per cent. of the total drift excluding wing resistance is due to the engine and fuselage; and about 20 per cent. due to wiring, *e.g.*, cables and controls. It will be seen at once that here are two serious factors to be taken into account. Considerably less resistance is set up by streamlined objects. The "finess," *e.g.*, the proportion of length to breadth of the streamlined shape is dependent upon the velocity and is found by experiment. Obviously, therefore, it is necessary, after having brought down the projected area of all detrimental surfaces to the minimum, to carefully streamline same, and it is in this respect that recent machines have shown improvement. Upon investigating the weight of up-to-date machines it is difficult to see how any great progress can be made without lowering the factor of safety, which, under war conditions, is not desirable.

With the object of weight reduction in view, there are many reasons for giving particular attention to the weight per h.p. figure of the engine. It is the heaviest single item, and including radiator, exhaust pipes, &c., probably weighs about 40 per cent. of the total weight; therefore any successful attempt to reduce its weight appreciably brings down the weight per h.p. of the whole aeroplane. It may be argued that the limit in this direction is nearly reached, but progress is undoubtedly being made, and up-to-date machines show more signs of becoming lighter in this than in any other component.

Some of the more recent six-cylinder in line engines show considerable reduction in weight per h.p. with the additional advantage that they are more easily adapted to a well streamlined fuselage than is the Vee type. It would seem advisable to consider making the radiator an integral part of the body or wings, with a view to reducing resistance, as well as economising weight; attempts have been made at this in several German machines.

The possibilities of lightening the fuselage or wings do not appear to be great, but something may be achieved with an entirely new method of construction.

The weight of the bracing wires and turnbuckles, &c., used in present-day machines is considerable, and new designs show a tendency to eliminate these as far as the body is concerned either by substituting 3-ply bracing, also doing away with doped canvas, or alternatively employing a monocoque type of fuselage.

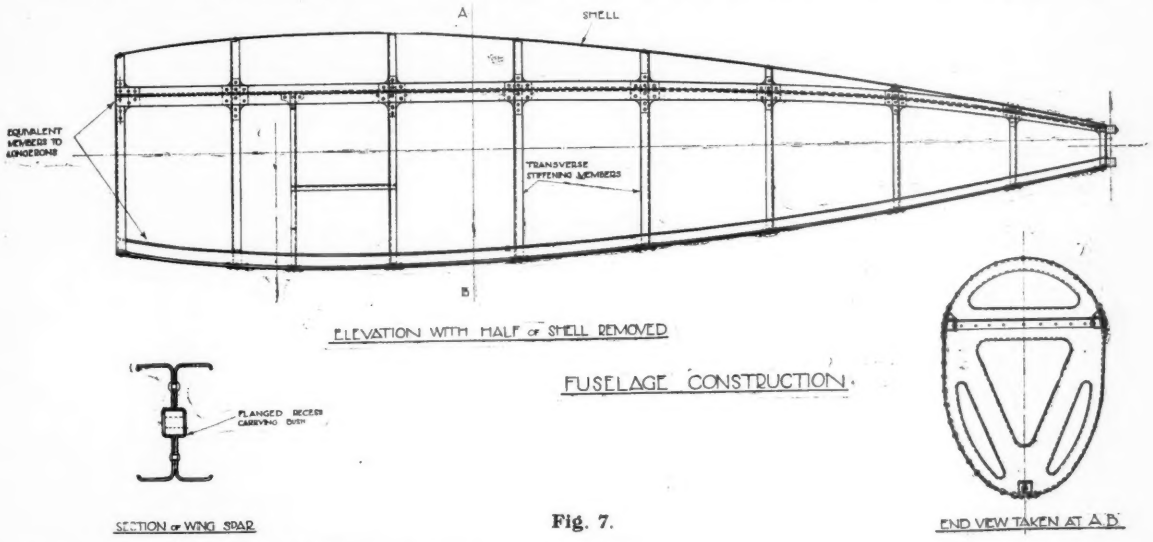

Fig. 7.

Suggesting a Method of Construction.

From the foregoing it may be seen that in setting out to arrive at the best possible construction of an aeroplane, we must, consistent with the necessary strength, consider before everything else the questions of streamline shape and weight reduction. Taking first the fuselage; to the author's mind the elimination of wood, canvas, and to a lesser extent wire bracing, is the keynote of improved construction. The stresses in the body are many and varied, and in extreme circumstances the whole of the fuselage may be under severe combined bending moments and torsion. An all-metal construction, preferably of duralumin, would seem to possess many advantages over the existing type, in addition to being non-inflammable. Duralumin is suggested here because it is the metal which most nearly approaches the standard of strength for weight required, and should not necessarily be regarded as absolutely suitable material.

Proceeding along these lines the method shown in Fig. 7 would appear to commend itself. In this system we still retain equivalent members to the *longerons*, but in all probability these need not be more than three in number, and would be of channel or tee section, built up as indicated, running the whole length of the body. At intervals would occur transverse stiffening members lightened out and flanged at all edges; these are riveted to the shell and connected also to

the longitudinal girders. The shell itself would be made in sections, and of varying gauge metal, so that the stresses would be proportionate along its length, while inspection doors could easily be provided whenever necessary.

What is now, on existing machines, a separate cowling, and where, as in several types, there is a separate fairing provided, from the rear seat down to the tail, would in this construction be an integral part of the whole body, as shown in Fig. 7.

In machines where a long engine is used, the front end of the fuselage could be strengthened up in order to relieve the shell itself of all stresses in these sections, so that it could be made completely detachable, for the sake of accessibility.

The flange transverse members employed in this construction lend themselves more readily to any scheme for carrying controls, supporting petrol tanks, seats, &c., than does the average cross sectional wire bracing.

A similar system to the foregoing would be applicable to the wings. In this case the main spars would be of tee or channel section, preferably a tee section, built up of two channel members back to back, riveted together, and provided at intervals with collars let into flanged recesses, which would serve the dual purpose of registering the members prior to drilling, and relieving the rivets of sheer stresses when in flight.

For bracing against drift the existing system of struts and wires could be employed, in which case the compression members would be of light gauge tubing, and the " formers " a simple flanged arrangement.

The leading edge could be of suitable section duralumin, and for the trailing edge oval tubing, such as is now used, would suffice.

When we consider the wing covering it becomes apparent that there are several difficulties to be overcome. The satisfactory attachment of the sheet metal is one. It is comparatively easy to cover the top, or the underside, by riveting to the " formers " and spars, but it is not easy to get at the rivet heads on the inside when both the top and bottom of the wing are covered. This might possibly be overcome by covering in sections or providing sufficient inspection doors.

Commencing with the fact that this construction is, for the same strength, lighter than the orthodox one, we will review some of the advantages possessed by it.

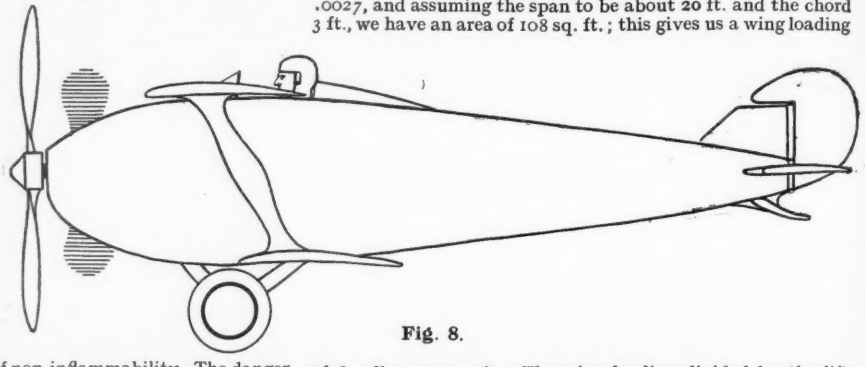

Fig. 8.

First and foremost is that of non-inflammability. The danger of fire is at the present day the most serious risk the average pilot takes, so that if this can be achieved, even at the expense of something less important, it is a step in the right direction. It naturally follows also that this system is impervious to most other elements, and will outlast any number of machines built of less durable material.

The absence of bracing wires is desirable. Existing machines, to be kept in trim, demand periodical adjustment, which is not a five-minute job, also oil and petrol will not deteriorate the shell as they do doped canvas. From the design point of view, more accurate workmanship is possible than with the materials at present employed, while there is less uncertainty about the ultimate strength.

The construction lends itself more readily to a well streamlined shape, and though, obviously not suitable for making in ones and twos, is eminently adapted for quantity production on a large scale, because of the number of parts which could be pressed out cold and would be interchangeable.

Descriptive of a Suggested " Sporting Model."

Having investigated the lines along which probable improvements may be expected, it is possible to form some idea of what a post-war machine may look like and of its probable performance. Assuming that we are considering a single seater aeroplane built for ordinary " run-about " purposes. For a machine of this class we do not require extreme speed, nor yet a very high rate of climb. Reliability is the prime asset, and so far as the engine is concerned this would probably mean sacrificing the last few ounces of h.p.; for the rest of the machine careful attention to detail design would be very necessary. . This may appear to be a summary dismissal of an important point, but it is one upon which a whole paper could be written. If our aeroplane is capable of a speed of 65 m.p.h. and can remain in the air for three hours at full power without coming down for supplies, we have a range of roughly 190 miles. This should be sufficient, as the average man would not wish to remain up much longer without a break. Economy in fuel consumption would be a necessity, and we will limit our prospective engine to four gallons per hour, which, bearing in mind that the average two-seater fighting biplane uses 20 gallons per hour, is a fairly low figure. That it is easily handled in the air as on the ground is desirable, and if the pilot can start up and get away single-handed so much the better. Stability, or what might be better termed " air-worthiness," would seem to demand special attention; this concerns the aerodynamical side of design, and the best results in this direction would possibly be obtained by working only along lines which have been well tried out in practice. The more weather-proof a machine is, the less maintenance work would be necessary, and here we should find the absence of anything requiring periodical adjustment advantageous. In addition, if the wings could be made to fold back without involving the use of too complicated a quick-release device, the question of storage would become much simpler. From these considerations it will be seen that our machine must be as small and light as possible. Remembering that we wish to fly somewhere in the neighbourhood of 65 to 70 miles per hour, and carry fuel for three hours' flight, we want to know roughly the total weight of our machine to estimate approximately its overall dimensions. We know that with a single-seater machine weighing about 690 lbs. and using an 80 h.p. engine we can attain a speed of nearly 100 m.p.h. This is faster than we require, so we shall need less horse-power, and, incidentally, this means less weight. If we calculate on a 50 h.p. engine we can assume our total weight will be somewhat lower than the above, but to be on the safe side we will take about the same, say, approximately, 700 lbs. Using a good average wing section, we should have a maximum lift coefficient Ky of about .0027, and assuming the span to be about 20 ft. and the chord 3 ft., we have an area of 108 sq. ft.; this gives us a wing loading of 6.4 lbs. per sq. ft. The wing loading divided by the lift coefficient gives us the square of the velocity, so that in this case our minimum speed is about 48 miles per hour. This is not too fast for landing, especially if brakes are fitted, which would also be desirable for starting-up purposes. The same wing section would have a Ky value at the optimum angle of about .0014, which would give us a maximum speed of 67 m.p.h. It is fairly apparent from comparison with existing machines that our surplus propeller thrust would be sufficient to give a moderate rate of climb. The figures used above are all approximate, but are well on the safe side. For instance, the lift coefficients (Ky values) are taken from the wing section now obsolete for fighting machines, and it is fairly certain that with progress up to date and in the future these would be greatly improved. The total weight of the machine would probably also be subject to considerable reduction below the figure given. Fig. 8 is an attempt to outline what, in the author's opinion, such a machine might look like. It will be noticed that special attention would be paid to streamlining, even at the expense of a little more projected area, the only exception to the rule being the cylinders, which, as we are assuming an air-cooled engine, must be left exposed. The engine which would seem to be most suitable is a 50 h.p. horizontally, or vertically, opposed twin, weighing about 85 lbs. This is shown in the sketch mounted vertically for aerodynamic reasons, in which case we are assuming that all engine difficulties such as lubricating the upper cylinder have been overcome. This engine would consume about four to five gallons of petrol per hour, which means about 16 miles per gallon, comparing favourably with many present-day cars. The overall length would be about 15 ft., and the greatest height about 5 ft. 6 ins., so that if we reckon upon folding wings, in which case the width would be approximately 8 ft. 6 ins., the machine would take up about the same amount of room as the average touring car.

ACCIDENTS AND THEIR CAUSES.

A GOOD deal of light is thrown on the causes of accidents at flying schools, in the course of an article in the *Journal of the Royal Naval Medical Service*, by Temp. Surgeon H. Graeme Anderson, M.B., Ch.B., F.R.C.S., R.N., who has seen some three years' service with the R.N.A.S. In putting forward an analysis of accidents which occurred at one station over a period of six months he suggests that medical officers should make a special point of recording in detail each accident, and puts forward a scheme for their classification designed to produce statistics which should materially assist those who are in charge of the training of flying personnel.

In the period of six months at one station where teaching is carried out 9,000 flights of an aggregate duration of 4,000 hours were carried out and fifty-eight aeroplanes were wrecked or crashed. This only includes machines which had to be deleted or sent into the workshops for repair or rebuilding. No account is taken of small damage such as broken wires or bent axle; which were repaired by the flight mechanics. There was thus one crash for every 155 flights. Of the fifty-eight crashes, fifteen involved injury—one fatal—to the pilot and in one case—dual control—the instructor and pupil were injured; this works out to one pupil injured in every 560 flights so "one can see that school flying is fairly safe and compares favourably with other high velocity forms of transit."

Nine crashes occurred on the first solo flight, a similar number on the second, four on the third, three on the fourth, three on the fifth, one on the sixth, eight on the seventh, one on the eighth, two on the ninth, one on the tenth, two on the twelfth and fourteen after ten hours. "The inference suggested is that by the time the pupil arrives at the seventh solo he often becomes over-confident and a little careless."

Analysing the causes of the accidents, Dr. Graeme Anderson finds that only one was due to an aeroplane defect—engine failure—forty-two were due to errors of judgment; seven to loss of head; four to brain fatigue, and four were unavoidable. Of the last mentioned two were due to obstacles concealed in the grass, and a collision—ten feet from the ground—accounted for the other two.

In three years' experience with the R.N.A.S., Dr. Graeme Anderson has not seen a machine actually break in the air, but he mentions one case in which an elevator wire came off a pulley and jammed, resulting in a dive from 200 feet and fatal injuries to both occupants of a machine.

Of the forty-two cases of "error of judgment" four occurred in getting off and thirty-eight on landing—the commonest form of the latter error being accounted for by misjudgment of distance, the pupil either flattening out too soon or too late. This may be due to under-instruction, vision being below normal; or delayed visual-reaction time "on which the aviator is so much dependent Normally this takes $\frac{19}{100}$ or $\frac{20}{100}$ of a second. It may be delayed by fatigue, drugs, and excesses; but, on the other hand, in some individuals who are otherwise physically fit, it is found to be much slower than in others. This raises the interesting point that in the selection of candidates for aviation the visual and other reaction times must be up to the normal standard. By the French medical authorities on aviation, candidates are rejected if the reaction times are found to be of the delayed type."

"'Loss of head' occurs fairly frequently in a greater or less degree and accounts for a fair proportion of accidents—seven in the series analysed. The pupil in his new occupation of flying for the first time has all his mental faculties on the alert at extreme high tension; the sense of danger, although not asserting itself, is ever present but sub-conscious. Under the sudden strain of an emergency his power to reason and act synchronously may momentarily lapse, resulting in what is known as loss of head. In a critical position the pupil has to think, decide and act quickly; but in loss of head the mental balance becomes upset—there is no mental inertia—but the wrong decision is taken and acted on. After loss of head there is seldom time to correct the error made." In contradistinction to "loss of head" the pupil in "brain fatigue" reaches the stage where he has neither the power to reason, decide or act. "A state of mental inertia supervenes. This is due to repeated stimuli received by his brain in rapid succession in his flight; he feels alone; a succession of errors occur in the air; he feels he cannot manage to control the aeroplane; fear does not seize him, but the enormity of the whole thing appals him; he feels helpless and a state of brain fatigue occurs in which in a stupor he awaits events and takes little part in the aeroplane control." After studying one hundred pupils' first-solo-flight-confessions, Dr. Graeme Anderson is convinced that brain fatigue is accountable for a fair proportion of accidents. Pupils liable to it should give up flying as they are not of a suitable temperament for air-work. "Fear" is rarely experienced in first solo flights; there is too much to do in watching instruments, &c., but many pupils confess that fear is sub-conscious—that there is a sense of danger lurking somewhere at the back of the head, but that it rarely if ever asserts itself.

Although of the crashes analysed, none was attributable to physical illness, Dr. Graeme Anderson points out some of the dangers, especially that of flying on an empty stomach, which may lead to faintness in the air. He however mentions two cases of pupils who suffered from attacks of malaria in the air, and were made to discontinue flying, while another pupil developed epilepsy. The latter had an accident—after a steep descent he made no attempt to flatten out—which was undoubtedly due to his having had a fit in the air. Fortunately he was thrown clear of the machine and escaped with a sprained ankle.

On the vexed question of safety belts Dr. Graeme Anderson gives it as his opinion that before leaving the ground all aviators should see that their safety belts are fastened and should be familiar with the method of their quick release; the belt should never be undone in the air. In sixteen crashes on tractor machines (with seventeen injured), the belt held on seven occasions and gave way on ten; of the forty-two crashes in which the pilot escaped the belt held in twenty-eight instances and gave way in fourteen. "The ideal safety belt should be broad and resilient, attached to the framework of the aeroplane and not to the pilot's seat, should be made to release easily and quickly, not at the centre of the pilot's body but at the side, where it is attached to the aeroplane. This release should be effected by means of a small hand lever. It is advisable for all pilots to carry a stout knife in the outside pocket of their flying coat in order to cut the belt should they be held in upside down in a crash."

Dr. Graeme Anderson advocates the wearing of safety helmets by all pupils but emphasises that they should be well-fitting and not be easily dislodged from the head whilst flying. He says that in fifteen of the cases considered the pilots were certainly saved from head injury by their safety helmets. The wearing of goggles, made of Triplex glass, is also strongly advocated.

In outlining a scheme for ambulance arrangements at flying schools Dr. Graeme Anderson says that if an accident occurs at a distance— a mile or more—from the aerodrome it is better for the surgeon to go by aeroplane. "I have now gone by air to over thirty forced landings and accidents at a distance and am convinced of the utility of this method in arriving quickly and not otherwise tired and out of breath as after a long run."

◈ ◈ ◈ ◈

Hull to Australia.

THE Hull Chamber of Commerce has already raised £919 towards the cost of the aeroplane which it has been decided is to be presented to Australia.

Huddersfield to Canada.

ON Saturday last at Huddersfield the aeroplane presented—at a cost of £2,100—by the Huddersfield Chamber of Commerce through the Imperial Air Fleet Committee, was formally handed over by Mr. E. J. Bruce, President of the Chamber, to Sir George Perley, High Commissioner for Canada, who passed it on to Major Baird, Parliamentary Secretary to the Air Council, for service on the Western Front. The machine was named Huddersfield by Mrs. E. J. Bruce, and Lady Perley affixed a mascot in the form of a bearer and a maple leaf with the inscription "Heaven's Light our Guide." The ceremony took place in the Greenhead Park, but owing to the bad weather the programme of flying which had been arranged had perforce to be considerably curtailed.

Speaking at the luncheon previous to the open-air ceremony, Major Baird said that there was an immense future for aircraft in the development of commerce after the war, and he looked forward to the time when it would be possible to go from London to Huddersfield in a great deal quicker time than by train, to land somewhere near the town, and continue by air to Canada. This country would cease to be an island unless they could defend it from the air, just as in the past they had had to defend it from the sea.

DIMENSIONS OF STEEL TUBE STRUTS.

By CARLO MAURILIO LERICI, Electrical and Aeronautical Engineer.

THE accompanying graphs have been prepared in order to facilitate the calculation of the dimensions of such circular and streamline steel tubes as are employed in aeroplane construction. The diagrams give directly the compression permissible for a maximum load of 10 kg. per sq. mm. (13,750 lbs./sq. in.); that is to say, with a factor of safety of six for steel commonly employed having an ultimate strength of 60 kg. per sq. mm. (82,500 lbs./sq. in., or nearly 37 tons per sq. in.). The streamline section tube is that of minimum resistance (Fig. 1), tested by Eiffel and adopted as standard

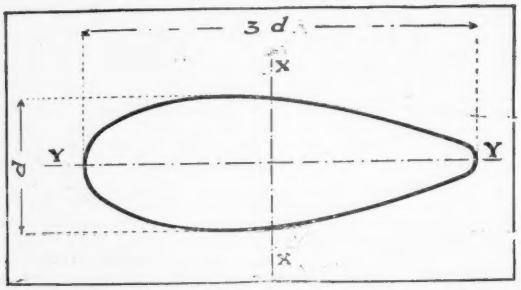

Fig. 1.—Standard section for streamline steel tube.

by nearly all the constructors of the world. The fineness ratio of this section is about 3. The ratio of the two moments of inertia I_{xx} and I_{yy} is about 5. It will be easily seen that there is an almost constant relation between strength in compression of circular and streamline steel tubes.

For the standard type (Fig. 1) I have found that the streamline tube whose section has the external dimensions $d \times 3d$ has the same compressive strength as a circular section tube of the same length and thickness (gauge), having an external diameter = 1·5 d. This factor has formed the basis for the graph (Fig. 2). The following data are given: W = normal compressive load, L = length of tube. The graph shows that for each value of W there are generally several solutions according to the different values of the thickness adopted. In this connection it should be noticed that, in order to attain maximum lightness, one should adopt the minimum possible thickness s. The ratio of s to d should not be less than 1/30.

It should also be pointed out that the condition of minimum weight for streamline tubes exposed to a current of air, as the struts of an aeroplane, is only convenient in machines having a low flight speed. Generally it is possible to so dimension these tubes as to render minimum the power absorbed by their weight and by their head resistance. In the best of modern high-speed machines the total power P absorbed by one meter of streamline tube exposed to the air is given by the formula:—

$$P = \frac{dv^3}{10^6} + \frac{34vds}{10^4}$$

d in cm.
s in cm.
v in metres per second.

$$P = \frac{7{\cdot}25dv^3}{10^8} + \frac{7{\cdot}85vds}{10^3}$$

d in inches.
s in inches.
v in ft./in.

An examination of this formula gives the following results: (1) For machines having a speed of not more than 120 km. per hour (75 m.p.h.) the minimum value of P is obtained by giving the struts a thickness of between 0·8 and 1·6 mm. ($\frac{1}{32}$ in. and $\frac{1}{16}$ in. respectively). (2) For machines of which the normal speed varies between 120 and 160 km. per hour (75 and 100 m.p.h.) the optimum thickness varies between 1·2 and 2 mm. ($\frac{3}{64}$ in. and $\frac{5}{64}$ in.). (3) For speeds between 160 and 200 km. per hour (100 to 125 m.p.h.) the optimum thickness varies from 1·6 to 2·4 mm. ($\frac{1}{16}$ in. to $\frac{3}{32}$ in.). (4) For speeds above 200 km. per hour (125 m.p.h.) the struts should be given the maximum possible thickness, weight having no longer any appreciable influence.

It sometimes happens that one has to depart from these dimensions giving maximum efficiency in order to avoid during flight every vibration that might diminish the compressive strength of struts. For instance, this happens when the frequency of the struts' proper vibration under normal load

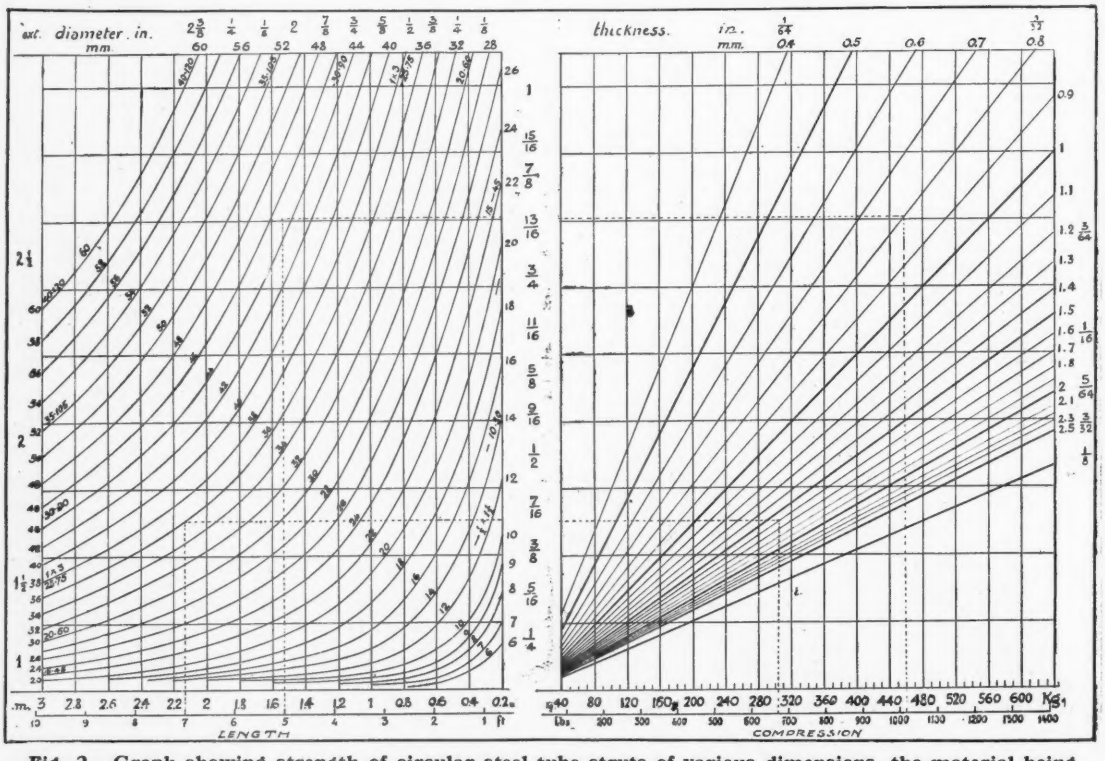

Fig. 2.—Graph showing strength of circular steel tube struts of various dimensions, the material being assumed to be steel of ultimate strength of 37 tons per sq. in. For the section shown in Fig. 1 the values found for circular struts must be divided by 1·5. Other streamline sections would, of course, have different values.

coincides with or is a multiple of the number of revolutions of the motor. Such a phenomenon of resonance can be countered by modifying one of the dimensions *s* or *d*.

The following examples show the method of using the graph :—

(1) *Centre Section Strut.*—Streamline section. Steel of 60 kg. per sq. mm. (82,500 lbs. per sq. in.). Factor of safety = 6. Length, 7 ft. Compression in strut, 670 lbs. Thickness $s = \frac{1}{16}$ in. From the diagram it will be seen that the circular tube has an external diameter of 36 mm. ($1\frac{7}{16}$ in.). Streamline tube having same strength, $d = 36{:}1{\cdot}5 = 24$ mm. ($\frac{9}{16}$ in.). As the fineness ratio of the strut is three, the dimensions should be about 1 ft. 3 ins.

(2) *Chassis Strut.*—Streamline section. Steel, 60 kg. per sq. mm. (37 tons per sq. in.). Factor of safety, 6. Length 5 ft. Compression under normal load, 1,020 lbs. Thickness $\frac{3}{32}$ in. The circular tube indicated in the diagram as being of the requisite strength for this load has an external diameter of 45 mm. ($1\frac{3}{16}$ in.). Streamline tube having same strength $d = 45{:}1{\cdot}5 = 30$ mm. ($1\frac{3}{16}$ in.). As the ratio of *s* to *d* is less than 1/30, it will be advisable to adopt a thickness of $\frac{3}{64}$ in. In that case $d = 41{:}1{\cdot}5 = 27{\cdot}5$ mm. ($1\frac{3}{32}$ in.).

HONOURS.

Honours for Mesopotamia.

IT was announced in the *London Gazette* of February 7th that the King has been pleased to approve of the following reward for distinguished services rendered in connection with military operations in Mesopotamia. Dated January 1st, 1918 :—

The Military Cross.

Lieut. (Temp. Capt.) L. J. Bayly, R.G.A. and R.F.C.

Amendment.

The following is the correct description of the undermentioned officer whose reward (the Military Cross) was announced on January 1st :—

Lieut. J. V. Tunbridge, Aus. F.C.

Gotha Destroyers Honoured.

IT was announced in the *London Gazette* on February 8th that the King has been pleased to approve of the award of the Military Cross to the following officers :—

Temp. Capt. G. H. HACKWILL, Gen. List and R.F.C.

Lieut. C. C. BANKS, R. Welsh Fus. and R.F.C.

For conspicuous gallantry displayed when they engaged and shot down a Gotha raiding London. During the engagement, which lasted a considerable time, they were continually under fire from the enemy machine.

[It was during the raid on January 28th that the Gotha was shot down, and, as recorded in last week's "FLIGHT," the names of the above officers were announced by Mr. Macpherson in the House of Commons on January 30th.]

Military Medals.

IT was announced in the *London Gazette* of February 5th that the King had been pleased to approve the award of a Bar to the Military Medal to the following :

7773 1st Air-Mech. H. R. Deane, R.F.C.

The King has been pleased to approve of the award of the Military Medal for bravery in the field to the following :—

44243 2nd Air-Mech. F. F. Dawson, R.F.C.

25362 Cpl. S. H. Platel, R.F.C.

REVIEW.

Chasseurs de Boches. By Jacques Mortane, L'édition *Française Illustrée*, 30 Rue de Provence, Paris. Price 4*fr.*

"Un as" it may be explained, is merely the pre-war French for an ace of any suit. Since 1914 the only correct suit has been one of horizon blue : and the only kind of "as" deserving any mention in patriotic circles, is that particular ace of trumps who is a *chasseur de Boches*, and has furthermore, brought down at least five of that particular quarry. About him, then, as the most spectacular unit of the fifth arm of modern warfare, M. Jacques Mortane has written, not only the most comprehensive history of French military aviation that has appeared since the war, but a remarkably close study of the technique of aerial warfare. Added to which he has written it in a style which is something well above the somewhat cold precisions of newspaper French, although—may one suggest—something short of the dramatic touch of a Faroux or the delicate prose of one of the great classics.

Yet mere questions of literary style, fine as that of M. Mortane is, are less the point of the present matter than his clear analysis of that very technique of war-flight. The impression one gathers from his meticulous descriptions of the method of each of his great "as" is, that as with great violinists there is no specially approved technique, superior to all ; but that each has his own manner. For instance, Roland Garros and Navarre as cases in point—one will be purely a virtuoso, an acrobat ; another, notably Guynemes, "*l'as des as*," purely classic and *methodiste*—the sense does not express itself well in English—while yet a third, as for instance the marvellous Nungesser appears as a Sarasate, a Kreisler, a phenomenal master of all tactic and technique, and gifted with the ability to fit invariably the appropriate method to the given occasion and circumstance.

So much, for those who survived long enough to identify themselves and their method with any given style, or who like Nungesser himself, still remain to astonish us with their marvellous *maestria*. But it is, perhaps, not the least merit of M. Jacques Mortane's work—one that does infinite credit to his perceptions of the matter *au large*—that he gives no less prominence to such pilots as Rene Dorme—the "*gloire disparue*," who had he lived yet a little longer, might well have shown himself to be among the greatest of his craft. So too with the others, Maxime Lenoir, Delorme, Auger Pourpe, Lecour-Grandmaison, and—only too many that have passed. And yet mournful though this long and brilliant story may be, it is not without its touches of humorous incident, and no less permits one to hope that all the giants have not departed, that there still remain others, who may prove as great or greater. As for instance that extraordinary soldier of fortune, Raoul Lufbery. . . .

Altogether a book which, in the hackneyed phrase, "no enthusiast's library should be without," truly so for once ; one that as a record, must become a classic of flight.

From Germany to Holland.

INCLUDED in the party of British officers and men which arrived at Scheveningen on February 7th from Germany for internment in Holland were Capt. R. A. Boger, R.F.C., Capt. Robin Grey, Grenadier Guards and R.F.C., and Capt. V. S. E. Lindop, R.F.C.

Another French Pilot Home from Germany.

AT his fifth attempt Sergeant-Major Boudon, a French pilot who was shot down and taken prisoner by the Germans, has succeeded in escaping from Bavaria.

German Leaflet Droppers.

AT a time when the Germans savagely sentenced two British aviators to ten years' imprisonment for dropping leaflets in their lines, their aviators were busy pelting the Italian front with this form of propaganda.

"German and Austrian machines have been very busy lately dropping leaflets on and behind the Italian lines," writes the *Times* correspondent at the Italian Headquarters on February 5th. "These are signed, 'the Austro-Hungarian soldiers,' and incite the Italian Army to conclude peace with them, and giving the designedly false impression that Bolshevist formations are arising in the Austrian Army. Others declare that Italy is 'the latest British colony,' with a British censorship in Naples and a *Kommandantur* and military governorship in Rome, and that British troops have fired on rioters in Milan—all, of course, preposterous nonsense. There is good reason to believe that the night raiders on Padua and other towns are all Germans flying A.E.G. three-seater bombing machines, and belonging to specially trained formations from the German air camps in Belgium. Several of the German flights, other than bombing squadrons, have left for the Western Front, supposedly to take part in the talked of great offensive."

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

THE FLYING SERVICES FUND, administered by THE ROYAL AERO CLUB.

THE Flying Services Fund has been instituted by the Royal Aero Club for the benefit of officers and men of the Royal Naval Air Service and the Royal Flying Corps who are incapacitated on active service, and for the widows and dependants of those who are killed.

The fund is intended for the benefit of all ranks, but especially for petty officers, non-commissioned officers and men.

Forms of application for assistance can be obtained from the Royal Aero Club, 3, Clifford Street, New Bond Street, London, W. 1.

Subscriptions. £ s. d.

Total, February 12th, 1918 .. .. 12,603 15 6

H. E. PERRIN, Secretary.

3, Clifford Street, New Bond Street, W. 1.

THE ROLL OF HONOUR.

REPORTED by the Admiralty:—

Previously Missing (feared Killed), now reported Killed.

Flight Sub-Lieut. W. Johnston, R.N.

Previously Missing, now Officially presumed Killed.

Flight Lieut. C. J. Moir, R.N.

Died of Injuries.

Flight Sub-Lieut. H. B. Brearley, R.N.
Prob. Flight Officer N. C. Collett, R.N

Accidentally Injured.

Prob. Flight Officer E. Bradley, R.N.
Flight Sub-Lieut. J. T. Cameron, R.N.
Flight Sub-Lieut. J. H. Holland, R.N.
Wt. Engr. J. E. Jopling, R.N.R.
Prob. Flight Officer C. Mortimer, R.N.
Mr. R. H. Ormerod, Mid., R.N.

Missing.

Flight Sub-Lieut. F. T. P. Williams, R.N.
Flight Sub-Lieut. W. H. Wilmot, R.N.
Acting Flight Commander R. R. Winter, R.N.

Missing (believed Prisoner).

Flight Lieut. C. G. Bronson, R.N.

Reported by the War Office:—

Killed.

Lieut. J. R. Blair, Aus. F.C.
2nd Lieut. C. Donahay, Aus. F.C.
Major (2nd Lieut. Connaught Rangers) R. Gregory, M.C., R.F.C.
2nd Lieut. G. G. Johnstone, R.F.C.
2nd Lieut. R. C. Lovell, R.F.C.
2nd Lieut. R. G. M. McRae, R.F.C.
2nd Lieut. F. Robinson, R.F.C.
Lieut. F. W. Saunders, Welsh, attd. R.F.C.
2nd Lieut. W. S. Smallwood, R.F.C.
2nd Lieut. R. A. Smith, R.F.C.
2nd Lieut. M. M. Wilson, Bord. R., attd. R.F.C.
17417 Cpl. C. W. H. Roberts, R.F.C.

Previously Missing, now reported Killed.

2nd Lieut. J. K. Campbell, R.F.C.
2nd Lieut. G. Mathews, R.F.A., attd. R.F.C.
2nd Lieut. M. G. M. Oxley, R.F.C.
Lieut. B. A. Powers, Middx. R., attd. R.F.C.
Capt. P. B. Prothero, A. and S. High., attd. R.F.C.
Lieut. E. A. H. Ward, W. Yorks. R., attd. R.F.C.
2nd Lieut. G. R. Wilkinson, D. of Corn. L.I., attd. R.F.C.

Previously Missing, now reported Died of Wounds as Prisoner in German hands.

2nd Lieut. R. S. Asher, R.F.C.

Accidentally Killed.

Lieut. A. B. Johnson, Manit., attd. R.F.C.

Wounded.

2nd Lieut. P. W. S. Bulman, M.C., R.F.C.
Lieut. B. Burton, W. Yorks. R., attd. R.F.C.
2nd Lieut. M. E. Gonne, R. Fus., attd. R.F.C.
2nd Lieut. J. H. F. Hambly, R.F.C.
Lieut. J. P. B. Harold, R.F.A., attd. R.F.C.
2nd Lieut. A. P. Hutton, R.F.C.
2nd Lieut. D. F. Lawson, Dorset R., attd. R.F.C.
Capt. A. M. Maclean, Yeo., attd. R.F.C.
Lieut. H. T. Thompson, R.F.A., attd. R.F.C.
2nd Lieut. F. M. Woolner, R.F.C.
60027 2nd Air-Mech. F. J. Green, R.F.C.
94367 2nd Air-Mech. G. R. Marston, R.F.C.
973 Sergt. W. R. McCleery, R.F.C.
22921 2nd Air-Mech. W. W. Mullins, R.F.C.
29298 1st Air-Mech. J. J. Press, R.F.C.
13560 1st Air-Mech. A. G. Sanson, R.F.C.
20921 2nd Air-Mech. J. W. Sawyer, R.F.C.
48669 2nd Air-Mech. P. Stokes, R.F.C.

Missing.

2nd Lieut. W. J. R. Borthistle, Muns. Fus., attd. R.F.C.
2nd Lieut. H. S. Clemons, A.S.C., attd. R.F.C.
2nd Lieut. E. Cunnigham, R.F.C.
2nd Lieut. F. E. Lefevre, M.C., Linc. R., attd. R.F.C.
2nd Lieut. J. M. Milne-Henderson, R.F.C.
2nd Lieut. S. Reay, R.F.C.
Lieut. K. M. Rodger, A. and S. H., attd. R.F.C.
2nd Lieut. L. G. Taylor, R.F.C.
2nd Lieut. C. L. van der Hoff, R.F.C.
Lieut. A. G. Whitehead, W. Yorks., attd. R.F.C.
2nd Lieut. L. J. Williams, R.F.C.

Missing (believed Drowned).

Lieut. W. A. Crawley, Can. Inf., attd. R.F.C.

Previously Missing, now reported Prisoners in German hands.

2nd Lieut. I. D. Cameron, R.F.C.
2nd Lieut. R. H. Cowan, R.F.C.
44969 2nd Air-Mech. F. H. Bastick, R.F.C.
2nd Lieut. J. Brydone, R.F.C.
2nd Lieut. H. V. Caunt, W. Yorks. R., attd. R.F.C.
2nd Lieut. H. E. Galer, R.F.A., attd. R.F.C.

Fatal Accidents.

LIEUT. L. M. BARLOW, R.F.C., was killed in the Eastern Counties on February 5th through falling from a height of 150 ft. His machine made a spiral nose dive and took fire.

As the result of a collision in the air at an aerodrome in Lincolnshire on February 6th, two officers, Lieut. C. H. Keefe and Lieut. L. Riley, both of London, were killed.

Whilst completing the last mile necessary to secure a pilot's certificate, T. Condran, R.F.C., was fatally injured in the neighbourhood of Nottingham.

Lieut. J. Hardy has been killed in an aeroplane accident near Woodstock, Oxfordshire.

German Indignity to British Pilot.

APPARENTLY with the idea of stirring up feeling against Great Britain among the population—some citizens having unfortunately lost their lives in the British air raids on German military establishments—the Germans recently marched a British pilot, who had fallen into their hands, through the streets of Ghent. According to the *Telegraaf*, the result of this inexcusable treatment was not at all what the Germans expected; although the crowds did not dare to cheer the airman, there was no doubt as to their silent sympathy.

FLIGHT

FELT IN AIRCRAFT CONSTRUCTION.*

By S. W. WIDNEY, President of the Advance Felt Specialty and Cutting Co., Chicago.

THE general knowledge of felt is not at all in proportion to its general use. The average farmer, doctor, lawyer, clerk or artisan knows little about felt and its various uses; notwithstanding he wears a felt hat, and probably a felt strip inside of its sweat band to make it fit and feel better on his head. He has felt padding in his coat—what would a well tailored coat be without a felt padding in and about the shoulders? He has felt in his shoes—the heels of over 90 per cent. of the shoes worn have a small felt pad which acts as a cushion and covers up the rough leather without which there would be many very sore heels. So much for the most common uses of felt in connection with the average person's apparel.

Its mechanical uses.—Felt, as a material used for mechanical purposes, is very common and extremely diverse.

Cushions—to relieve jar and eliminate noise. To cover up rough surfaces. To go between two metals—one or either of which has a rough surface. Used in this manner it is called a "gasket," thus eliminating the necessity of machining the surface they cover or go between.

Felt for lubrication is very common. The best oil wicks for feeding oil to both high and low-speed bearings are made of felt. Felt for oil retention in bearings, as well as dirt and dust exclusion from oil bearings, is almost universally used.

Used for elimination of vibration.—The use of felt for the elimination of noises or rattles has grown wonderfully the last few years. Up to a few years ago rubber was most commonly used, but experience proved that rubber invariably lost its original cushion qualities or resiliency, and after a short time became dead—got hard and non-elastic—with the result, it did not function at all.

Felt for mechanical purposes of this nature, therefore, is fast supplanting rubber, as it will retain its resiliency for ever. Being made of wool, or a large percentage of wool, time works little change in its cushion qualities, while with rubber—a vegetable product—time is sure to work a change.

Take the high-grade automobile body builders. They are to-day using felt almost exclusively to eliminate noises and rattles in frames and sash. They formerly used rubber, but found after a few years that rubber became dead and non-resilient.

The past year or so has seen many rubber parts supplanted by felt. Mechanical devices have made it possible to turn out various intricate shapes in felt, heretofore thought impossible, where it was thought only rubber, which could be moulded into any given shape, could be used.

Great strides are also being made by chemists who are hard at work impregnating felt with various ingredients so as to make it less susceptible to the action of water, oil and various elements with which it may come in contact.

Arriving at a standard.—It has been admitted by the purchasing agents of some of our largest institutions that felt was the only item they bought from which they had no standard to work. Not until very recently was a testing machine perfected, which will enable a buyer of felt to specify comprehensively and definitely the density or consistency of the goods he desires, as well as the thickness.

Ever since felt was made the density or consistency of the goods has been a matter of human touch, which is only a guess at best and one person's opinion against another, which obviously meant constant arguments between buyer and seller.

A newly devised testing apparatus.—The scleroscope embodied all of the fundamental principles necessary to determine the density of felt. However, a special machine to meet the special requirements had to be worked out and a standard scale had to be inaugurated, as a base, from which to work.

This equipment has now been perfected and special machines for testing the density or hardness of felt can now be procured so that the buyer and seller can understand each other in this particular. This marks a big stride towards felt specification standards.

With regard to the analysis of felt, instruction sheets which are easily comprehended are procurable with these machines, showing how to determine density or hardness along with the thickness of a given piece of felt, also telling how to determine the percentage of wool and cotton and to reveal the presence of any foreign substance, such as dirt, grit or other foreign matter. Of course, an expert chemist can go to most any distance he desires in this analysis test. But an ordinary layman can with these brief instructions, and at a very nominal expense in equipment, test felt as far as the requirements demand.

* *Aerial Age* (U.S.A.).

Need for clearer understanding of felt.—An extensive educational campaign is now being carried on with the users of felt products with the view of acquainting them with the vast difference in results obtained from different grades of felt.

Felt varying so widely in its analysis as well as consistency the buyer or engineer rarely, if ever, is in a position to decide definitely just what analysis or consistency of felt is best suited for the particular need. Their laboratories usually are able to figure out their requirements on steel, just how much carbon, how much nickel, how much manganese, &c., they must have; but on felt they *guess*. They want this or that, usually determined by the hardness.

The different grades of felt.—Felt is made of wool or wool and cotton—the former is known as "all-wool" felt, and the latter as "cotton mixed" felt. Some felts contain 90 per cent. wool and 10 per cent. cotton. Some 90 per cent. cotton and 10 per cent. wool.

There are many grades of wool, which may be roughly classed as follows:—

Fine wool.—(Virgin stock), which may be long or short fibre—straight or kinky.

Coarse wool.—(Virgin stock), which may be long or short fibre, but usually coarse wool is straight and has very little kink in it.

Wool shoddies.—Which are a repossessed stock, from old scrap wool felt or various wool fabrics. These obviously have less length of staple or fibre to them than virgin stock, and naturally are not as desirable. Shoddy is used extensively in all cheaper grades of felt, particularly cotton-mixed felt.

The grades of cotton used in felts are not as varied as the wool used, and are of much less importance.

Determining the grade to use.—In the making of hard felt it is necessary to use practically all wool, as cotton cannot be hardened in the felting or fulling process. When cotton is used with a high percentage of shoddies it becomes necessary to use glue sizing to make the felt hard. Any felt that is glue-sized, no matter what the analysis, when subjected to most any mechanical use, rarely stands up, and in most instances proves unsatisfactory.

If it is soaked in oil, the glue soon is worked out and the fibre has nothing to hold it together, where with an all-wool felt, hardened or fulled by the shrinking process, commonly used in felt making, will retain its original hardness indefinitely. Sized felt should never be used, only after conditions are taken into account and thoroughly understood.

In many cases we find certain felts being used where another quality, density or thickness, would be much more suitable.

For a bumper or cushion many times we find certain felt being used that is not at all well adapted as to quality, density or thickness, for the particular need.

For Lubrication Purposes.—For lubricating purposes, the same situation exists. For instance, for oil wicks, different qualities and densities of felts should be used, where different conditions exist. An extremely dense felt with a high percentage of cotton, will not feed heavy oil to a high speed bearing, sufficiently, where it might, if a light oil were used, &c. In other words, where felt is used in connection with oil lubrication, the quality and density of the felt best suited for the purpose depends much upon the grade of oil that is used.

Felt for oil retention, around housings, &c., and for dust and dirt exclusion; various problems arise here, that are frequently overlooked by engineers. We often find a cheap quality and very soft felt being used, that does not function at all properly, and as a result oil fairly oozes out around the bearing soon after the machine is out and in operation. One has to but visit any garage and notice the many automobiles with oil dripping down over their axles—all over the wheels—the transmission or differential. This means that improper felts have been installed.

Felt from the Purchasing Agent's Standpoint.—In these times, when many purchasing agents are trying to buy as cheaply as possible, it is not surprising to see cheap felts bought and installed, for in few instance does the purchasing agent realise that a cheaper price means cheaper felt—felt to most of them is simply felt. This is in no sense a reflection on the purchasing agent, for he has never been educated in felt values. In some cases we find a thick, cheap, soft, mushy felt

being used to eliminate vibration, or to act as a cushion—with the result—it flattens out like a pancake and affords no cushion at all. In instances like this, a thinner but firmer and better grade of felt can be used with much better results.

Not always does the purchasing agent buy too cheap a grade of felt; on the other hand, very recently, a purchasing agent was about to place an order amounting to over $30,000, and was shown where something much cheaper functioned better, and meant a saving of over one-half the cost.

From the Engineer's Standpoint.—Engineers are better versed in this particular, and many know that different felts function differently, but cannot tell why.

Felt to them is an enigma, but before very long they will become educated and can test felts and can ascertain just what quality, what density and what thickness, functions best, for a given purpose, and will be able to specify clearly to the manufacturer of their felt parts in their orders, just what they want, and can check up the goods when they receive them, and know whether or not they received what they ordered.

Felt Uses Rapidly Increasing.—The use of felt parts is bound to increase as engineers and inventors become more familiar with felt and its various properties.

Piano manufacturers have long appreciated the importance of felt in the construction of their pianos, felt being used very extensively and performing various functions.

Automobile manufacturers and motor builders are installing more felt parts every day—discontinuing the use of rubber, leather, &c.—materials whose function is resiliency.

Aeronautic engineers are fast appreciating the value of felt as an absorber of shocks and a noise deadener; also as padding and bumpers. Also the very important part it can play in the all-important problem, with aircraft engineers—the elimination of vibration.

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QUESTIONS IN PARLIAMENT.

Air Raids and German Prisoners of War.

MR. BUTCHER, in the House of Commons on February 5th, asked the Under-Secretary of State for War whether he has now any official information to the effect that hundreds of British and French officer prisoners of war have been sent to Stuttgart and other places in order to be subject to the risks of air raids; and whether he will take steps to inform the German Government that, if and so long as they indulge in such practices, German prisoners of war will be brought from Donington Hall and elsewhere to London and other places where they will share with women and children and other non-combatants the dangers of attacks from the air by Germans?

Mr. Macpherson: Information has been received which leaves no doubt that the German authorities have placed officer prisoners of war in localities which are specially subject to air raids. Similar action is contemplated in this country.

Colonel Leslie Wilson asked the Under-Secretary of State for War whether there are any and, if so, how many hospitals in the London district where patients suffering from shell shock are treated; if so, whether steps will be taken to remove all such patients to the West country or some other area in which they will be free from air raids?

Mr. Macpherson: As many cases as possible are being moved out of the London district, and 450 have just left. My hon. and gallant friend will realise that the difficulty of finding other suitable accommodation is considerable.

New Zealand Flying Corps.

COLONEL FABER asked the Under-Secretary of State for War if he will state why ten probationer certificated officers of the New Zealand Flying Corps, who left New Zealand in October and arrived in England early in December via the Panama Canal, were sent to Blackdown Camp, Surrey; whether five of them are now ordered to Egypt without any flying trial whatever; and whether it will be arranged for such officers to go in future by a shorter route than by the Panama Canal and Halifax to arrive in Egypt?

Mr. Macpherson: The probationer officers referred to were candidates for admission to a cadet wing, and passed through Blackdown to the cadet wing in the course of ordinary routine. While in the cadet wing five of them volunteered to join a draft of cadets for training in Egypt, where they will complete their cadet training and instruction in aviation.

Air Force Medical Service.

MAJOR DAVIES asked the Under-Secretary of State for War (1) whether the War Office has been requested by the Air Council to transfer Royal Army Medical Corps officers at present attached to Royal Flying Corps units to the medical services of the new Air Force; how soon this transfer will be carried out; (2) whether the Medical Advisory Committee has reported to the Air Council; and whether any steps have been taken to carry out the recommendations contained in this Report?

Mr. Walter Roch asked whether it is proposed to appoint a Director-General of Medical Services or a medical directorate for the new Air Force; and whether it is proposed to appoint a representative of the medical directorate on the Air Council?

The Parliamentary Secretary to the Air Council (Major Baird): The arrangements for the medical care of the Air Force are still under consideration, and I am not yet in a position to make any statement on the points raised in these questions. I anticipate that the matter will be settled at a very early date.

Mr. Hogge: Is the consideration towards a separate status?

Major Baird: I have nothing to add to the answer I have given.

Major Davies: How long has the matter been under consideration?

Major Baird: Since the question was first raised.

Mr. Hogge: Will it be signed before peace?

Distribution of Leaflets by Aeroplanes.

MR. ANDERSON asked the Under-Secretary of State for War whether he will give the name of the member of this House who in his private capacity suggested the scattering of leaflets from Government aeroplanes over Coventry during the recent industrial trouble; whether he is aware that the use of aeroplanes for this purpose, together with the character of the leaflets, has been much resented; and whether it is the intention of the Government to continue the sanction of the use of aeroplanes for purposes of this kind?

Mr. Macpherson: I am not aware that resentment has been aroused, as my hon. friend suggests, but as such a case is not likely to recur, I hope that the incident may now be regarded as closed.

Mr. Anderson: Will the hon. gentleman answer the first part of the question?

Mr. Macpherson: Certainly; the hon. member for Harwich.

Aircraft Construction in Dublin.

MR. REDMOND asked the Minister of Munitions can he now state whether definite steps have been taken to begin the construction of aircraft in Dublin; and, if so, when the work will be put in hand?

Mr. Kellaway (Joint Parliamentary Secretary to the Ministry of Munitions): Instructions have been given for a certain amount of work on aircraft to be carried out in Dublin, and an officer of the Ministry is making the preliminary arrangements.

Volunteer Searchlight Operators.

MR. BROOKES asked the Prime Minister if he is aware that a general feeling of resentment is felt by the searchlight operators of the Royal Naval Volunteer Reserve, Anti-Aircraft Corps, at the proposal to discharge them after three years' service, in view of the fact that they have frequently been commended for their efficiency during raids; whether, as these men are either over military age or ineligible for general service, they may be offered the opportunity of continuing in the corps by giving duty on alternate nights in accordance with the conditions under which they agreed to serve in the corps; and if he thinks that a band of Volunteers who have admittedly rendered good service should be superseded at a time when the man-power question is receiving so much attention?

Mr. Macpherson: The valuable work which has been performed by these members of the Royal Naval Volunteer Reserve is fully recognised; but, as I have explained, recent developments in searchlight work, and the great importance attaching to it for the efficient defence of the country against enemy aircraft, have necessitated a far higher degree of training for the searchlight detachments, and the necessary efficiency cannot be maintained with part-time men only.

United States Air Service.

MR. HOGGE asked the Under-Secretary of State to the Air Ministry what arrangements are made for medical services in connection with the United States of America Air Force; and whether this force has its own medical staff distinct and separate from that of the American Army and Navy?

Major Baird: I understand that the medical arrangements for the two branches of the United States Air Service are under the charge of specially qualified officers of the military and naval medical Departments.

Wages of Woodworkers.

MR. ANDERSON, on February 6th, asked the Minister of Munitions whether he is aware that a very serious situation has been created among the aircraft workers by reason of the fact that the agreement entered into between his Department and the National Woodworkers' Aircraft Committee, dated October 30th, 1917, and relating to wages, hours of labour, and overtime, has not yet been put into force; whether this delay is due to the obstruction and opposition of certain employers in this industry; and in view of the danger of industrial stoppage within the next few days, what action the Ministry proposes to take?

Mr. Kellaway (Joint Parliamentary Secretary to the Ministry of Munitions): The Ministry of Munitions have been in communication with the National Woodworkers' Aircraft Committee, and a meeting with that committee is taking place this afternoon. In these circumstances I hope my hon. friend will not press for an answer to the various detailed points raised in his question.

Mr. Anderson: I would really like to ask, in view of the very serious position that has been created amongst these workers, whether there is not something very far wrong when an agreement signed on behalf of the Ministry of Munitions by Sir Thomas Munro between three and four months ago has not been put into effect, and can the hon. gentleman tell us why it has not been put into effect at the present time?

Mr. Kellaway: As there are very good reasons for hoping that this question will be settled this afternoon satisfactorily to all the parties concerned, it is not desirable to go into the details.

Aeroplane Exports from the U.S.A.

DURING October, 1917, the value of the aeroplanes exported from the United States was $1,028,000, as compared with $123,000, the total for the corresponding month of the previous year. For the ten months ending October, 1917, the exports were valued at $5,235,000, a substantial increase on the total—$3,492,000—for the first ten months of 1916.

Ten Millions for U.S. Aerodromes.

IN a report sent to Congress Mr. Baker, the U.S. Secretary for War, suggests that the American Government should spend $50,000,000 on aeronautic bases in the United States and territorial possessions. He proposes that $24,000,000 should be allotted to the construction of sixteen aeronautic stations in the States, and $3,500,000 for twenty balloon stations. Aviation bases in Hawaii would absorb $4,420,000, and aviation bases in Panama $5,420,000, while $12,000,000 is suggested for the equipment of the various bases.

Aerial Mails in the U.S.

IN the Act making appropriations for the service of the U.S. Post Office Department for the year ending June 30th, 1919, which is now under consideration by the U.S. Senate, there is the following provision:—"Out of this appropriation, the Postmaster-General is authorised to spend not exceeding $100,000 for the purchase, operation and maintenance of aeroplanes for an experimental aeroplane mail service between such points as he may determine."

FLIGHT

WINGS OR PLANES?

By B. PASSAT.

It was perhaps not unnatural that the early pioneers in aviation, in their endeavours to make a flying machine, should have sought to imitate the examples which Nature has placed before us. Pilcher in England and Lilienthal in Germany experimented with gliders which had surfaces arranged very much after the style of a crow's wings, at least as far as their plan form was concerned. No doubt the leisurely way in which the crow rises and the graceful landing it makes tempted these early workers to try and reproduce such wings. Ader, in France, on the other hand, turned to something quite different, and to those who have seen his steam-driven "avion," as exhibited in Paris, it is evident that the bat furnished the idea for the sustaining surfaces. Unfortunately the work of Pilcher and Lilienthal was prematurely ended by the sacrifice of their lives, while lack of means brought Ader's experiments to a close.

Another pioneer, Octave Chanute, turning away fron Nature, tried the old box-kite which the Chinese had invented thousands of years before. The success of his glider led Santos-Dumont and the Voisin brothers to follow similar lines in their early machines, but they soon found, as the Wright brothers had done, that the vertical curtains were not necessary. This drew attention to the importance of the horizontal surfaces, and then came a period when interest was focussed upon the section of the planes. A great deal of experimental research was undertaken, and much controversy was aroused, in the efforts to produce an ideal wing section.

It certainly took two years before scientists and laboratory workers could agree on—what? Just two things—the chord and the camber, the latter being deemed specially important because the lifting power depended so much on it.

Now that efficient sections are supposed to have been found, thousands of planes are being manufactured and nobody can or is allowed to make anything else.

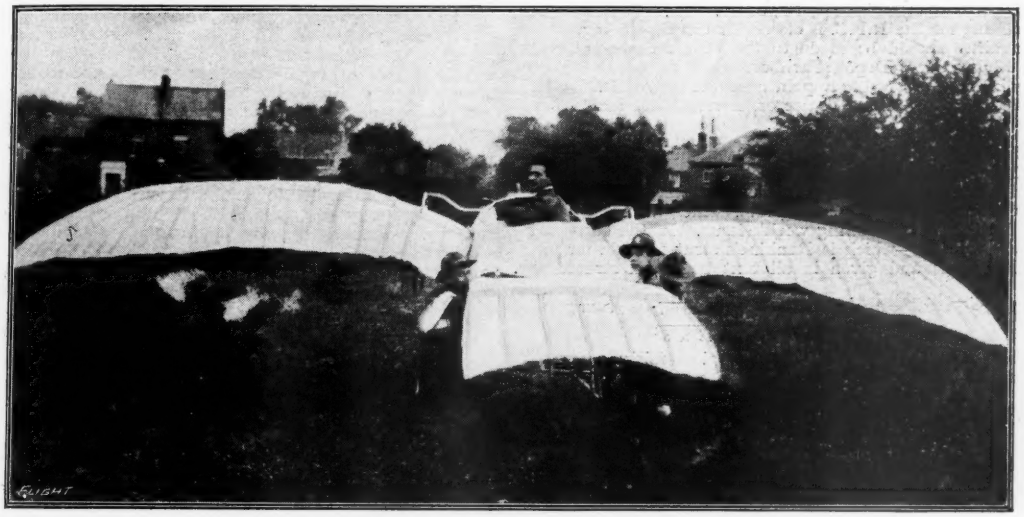
If we were to make a pair of planes and could fix them to a crow in place of its wings, would the bird still be able to make such beautiful glides and landings. I am certain it could not. Can we imagine that the curves and shapes of wings have been created only to please our eyes and make the birds look beautiful? Emphatically, no! Birds' wings appear to be so simple that many people think it is hardly worth studying their details now we have machines which can make their way through the air for long distances. This, I think, is a great mistake. Wings are the principal element of aerial locomotion, and it is absolutely essential that they should be able to go forward with as little resistance as possible. If we take the case of the wings of the condor or the albatross, we see that they carry the weight of the bird's body through the air with the minimum of resistance or friction owing to the provision by Nature of the flexibility of the wings and the consequent re-action of the air. These large soaring birds will start from their nests at daybreak and travel hundreds of miles with the expenditure of very little energy in an occasional flapping of the wings to recover their balance. This shows how far the flying machines of to-day are from Nature.

Mr. Weiss proved it some years ago with his large bird models, which after being launched could fly against the wind and even climb—landing a mile or so away. Mr. Weiss with the help of some friends was fortunate enough to build a full-size machine, but he failed mainly owing to constructional defects; the wings were not strong enough, and the system of attachment to the body practically nullified the advantages which the models possessed. To my mind this shows that this pioneer had with his models solved the problem of flight by *tatonnement*, but failing to recognise the fundamental principle when he came to construct his large machine he did not obtain the advantages that characterised the models.

If Mr. Weiss had succeeded at Brooklands with his winged monoplane the system would have been universally adopted, and planes as we know them to-day would never have become what may perhaps be called orthodox practice.

I have built a great number of wings, copying them as near as possible from all sorts of birds—sparrows, pigeons, crows, ducks, geese, partridges, swallows, blackbirds, seagulls, &c. I have spent many hours in the Natural History Museum at South Kensington studying the wings of eagles, condors and vultures. I have reproduced them and tested them in various ways in different winds. I have found it quite possible to make these wings as large and as strong as the planes which are now being used.

I have built a wing which will carry a weight through the air without requiring any propulsion whatever. I have experimented with it on a car going at 40 miles an hour, and the wing though loaded considerably not only kept up with the speed of the car, but even attempted to travel faster then the car. This fact, I think, proves substantially that if an aeroplane were equipped with wings similar to this, it would fly much faster and would be capable of very long distance flights on about one-third the power now required, which would mean a great economy in fuel consumption. To further demonstrate to anyone interested the superiority of wings over planes, I am willing and prepared to make a special pair of wings for a fair-sized model, preferably a monoplane.



M. Passat with one of early experimental machines.

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Germany and the Pope.

ACCORDING to a correspondent of the *Tribuna* on the Italian front, three German aviators who have been captured recently made a statement to the effect that as a consequence of the Pope's request, the Austrian Emperor forbade the bombardment of Italian open towns. The German aviators protested, and were supported by their commander, and subsequently the German General Staff ordered that no notice was to be taken of the orders from Vienna and such bombardments should continue.

ANSWERS TO CORRESPONDENTS

[As a number of letters reach us signed with initials only, some of which do not give a complete address, we would point out that such communications cannot be dealt with in our columns. Full name and address, which will not be published, must always be given.—ED.]

Notice to Correspondents in General.

Applications for commissions in the Royal Naval Air Service should be addressed to the Director of Air Services, Admiralty, S.W. The necessary form and a pamphlet giving the conditions of entry and other information can be obtained from the Secretary of the Admiralty.

Applications for commissions in the Royal Flying Corps should be sent to the Director of Air Organization, R.F.C. Air Ministry, Strand, W.C.

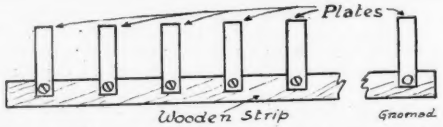
Those who wish to enlist in the R.N.A.S. should apply to the nearest naval recruiting station or to the R.N.A.S. Drafting Office, Crystal Palace, S.E. Skilled mechanics are taken whatever their army classification, but unskilled men are only taken if they are classified B1, B2, or C1.

Recruiting for the R.F.C. is closed for the time being, and any enquiries should be made to the Officer Commanding, Royal Flying Corps Depôt, Farnborough.

Enquiries with regard to appointments in the A.I.D. should be addressed to the Chief Inspector, Aeronautical Inspection Department, Air Ministry, W.C. 2.

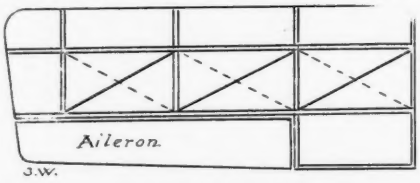
J. H. C. (Herne Hill).—In the first instalment of our article on "Metal in Aeroplane Construction" published in the February 22nd, 1917 issue of "FLIGHT" there occurred a printer's error in the strut formula, which was, however, pointed out in the following week's issue. In the corrected form the formula—which is Rankine's strut formula for pin connected ends and given in all text books on structural engineering—should be: $P = \frac{fc \times A}{1 + \frac{fc \times l^2}{\pi^2 \times E \times k^2}}$. Generally speaking, this formula is found to give fairly accurate results, and is extensively employed, although for aeroplane struts others have been suggested from time to time. Mr. J. C. Hunsaker carried out a series of tests on spruce struts which gave results as indicated in the following formula: $\frac{P}{A} = 6500 - 46{\cdot}5\ \frac{l}{k}$ when $\frac{l}{k}$ is less than 70, and $\frac{P}{A} = \frac{8{\cdot}72\ E}{\left(\frac{l}{k}\right)^2}$ when $\frac{l}{k}$ is greater than 70. E. the modulus of elasticity, for spruce is 1,825,000 lbs./sq. in.

R. L., 2nd Lieut. R.F.C. (B.E.F.).—sends us the following query: "Would you mind giving me your opinion on an engine question. The point concerns running up a Beardmore 160, which has just been filled up with hot water. Should the engine be run at less than 800 r.p.m. ? I hold that it should not, for the following reasons: 1. The plugs become slightly sooted and oily when she is kept ticking over. (No. 1 cylinder seems to be the worst offender.) 2. Being a high compression engine she vibrates like fury at very low speeds. I have been working with Beardmore engines since May last, and so far have never spoilt my engine through "revving" at 800. As the question appears to be one of general interest we have specially submitted it to an engine expert, whose reply is as follows: "I am of the opinion that 800 r.p.m. is not *too* slow for the engine to "idle." As your correspondent remarks, this engine has a high compression and is very prone to vibration, especially when running at anything near its revs., and a plug is missing. Intermittent missing will cause very serious vibration, and for this reason it is advisable to substitute new *hot* plugs if the engine has been kept "idling." for any length of time. Once a plug has "oiled up" it will more readily oil up again, and, of course, the plugs are liable to oil up more readily when the engine is idling. In one engine (12 cylinder high compression water cooled) I used a number of small plates which were inserted by a mechanic between the valve stem and the tappet while the engine was idling. The thickness of these plates was just sufficient to produce a slight loss of compression and explosion



pressure. In this way the engine could be kept running quite slowly and yet kept hot. Just before starting for a flight new plugs were put in and the valve "lifters" removed. I might mention, that these lifters were all screwed on to a strip of wood as indicated in the accompanying diagram. I presume that your correspondent knows that Beardmore *pistons* get out of shape very easily, and if one cylinder oils up the piston might be examined to see if it is blowing. Nothing is more unpleasant than to hear an engine just "kicking" over each dead centre, but nothing is more important than to make sure that an engine is *thoroughly* heated right through before it is put under full load for any length of time. So many mechanics think it is enough to get the water in the jackets warm and then "let her rip." This has caused a large number of breakdowns."

J. W. (Bradford).—The internal drift wiring of an aeroplane wing is frequently in duplicate to give an increased factor of safety. Should one wire be broken for some reason, the other would take over the function. In any case the drift wire in each bay is always made amply strong, whereas the



anti-drift wire may be made lighter, although a reversal of stresses may occur which would render it advisable to have both wires equally strong. In normal flight the wires which take care of the drift are those shown in full lines in the accompanying diagram. The anti-drift wires are shown in dotted lines.

B. S., Fl. Lieut. R.N.—A variable angle of incidence has been tried with excellent results, notably on the Paul Schmitt biplane, which established several world's records in the days before the war. The pros and cons of a variable incidence cannot be discussed in this column owing to lack of space, but if you are interested in the subject we would refer you to a description of the Paul Schmitt biplane which appeared in "FLIGHT" of October 30, 1914, a copy of which can be obtained from our offices, the price being 1s. It is not, we think, advisable, as you suggest, to do away with the elevator, since a certain amount of elevator control will be necessary while changing the incidence.

R. F. P. (Worcester).—For particulars regarding the American Air Service you should write to the Headquarters of the U.S. Military Mission, 30 Grosvenor Gardens, S.W.

A. O. W. (E. Dulwich).—You should write as directed above.

Cadet (Oxford).—Army Council Instruction No. 28 of 1918 authorises an advance of £9 for each officer cadet to be expended on clothing under the orders of the O.C. the cadet unit, who will arrange for the supply. On being commissioned cadets will draw £41 outfit allowance instead of £50.

French Air Champions.

IT has been announced in Paris that of the nine German machines brought down on February 3rd, six were brought down by three pilots. Lieut. Mahon now occupies the second place among the French aces with 22 Germans to his credit.

Game Law for Aviators.

SOME sporting aviators have already indulged, in the States, in the shooting of game from aeroplanes, and this has led the North Carolina authorities to pass a bye-law prohibiting the shooting of waterfowl above any of the waters of the state from an aeroplane.

AIRISMS FROM THE FOUR WINDS

NEXT week the House of Commons will probably have for consideration a new feature in the parliamentary programme—the Air Estimates.

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IT is the Aeronautical Supply Department of the Ministry of Munitions which is taking over the big range of important buildings in Kingsway, and not the Air Council. The latter still rules from the Hotel Cecil.

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LAST year "FLIGHT" offices were moved to more commodious premises in Great Queen Street, Kingsway, and a few months back we noted the opening in Long Acre—a continuance, as it were, of Great Queen Street—of an important aircraft supply company, venturing the query as to whether this was but the forerunner of Long Acre having the vogue of aircraft constructors as yet another phase in its utility as a centre of progress, Motorism having in its day monopolised this very convenient thoroughfare. It looks more than ever as if there may be a set in this direction now that the M.O.M. Aeronautical Supply Department has become a close neighbour of "FLIGHT" by its selection for its home of this huge block of buildings from Kemble Street up to Great Queen Street.

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TOUCHING the supply of material for aircraft construction, it would appear to be quaint that whilst on the one hand all efforts are urged to increase flax, particularly having regard to the needs of aeroplanes, our Foreign Office should see fit to more than neutralise these efforts by letting this vital product with other valuable commodities pass away from this country. That is the indictment set out by Mr. Ernest S. Brown, of 51, Milton Street, E.C., in a letter to the Press, in which he quotes the following figures :—

NORWEGIAN IMPORTS FROM BRITAIN.

Pre-war.	1916.
Linen, 235,000 yards.	1,650,000 yards.

BOARD OF TRADE RETURNS.

Oct., 1915.	Oct., 1917.
Thread for sewing, 1,582,000 lbs.	1,786,900 lbs.

Increase, 204,000 lbs.

Mr. Brown adds that at a meeting held in Belfast on January 31st, 1918, to encourage the growth of flax in Ireland, the chairman stated that "*they were so short of flax that the trade was faced with disaster*, and it would be nothing short of a calamity to the Empire if they could not maintain the supply of aeroplane cloth and the other necessary supplies made from linen which the Government required."

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THERE may be just a glimmer of hope in the fact that the date for the linen export is 1916; the figures for 1917 should be interesting.

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IN speaking at Huddersfield on Saturday, Major Baird, Parliamentary Secretary to the Air Council, said there was an immense future for the commercial development of aircraft, and he predicted voyages to Canada by air.

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SOME smoke! German smokers have just been informed that, in accordance with the decree of the Finance Minister, any mixture will still be regarded as tobacco in which the proportion of tobacco forms more than 5 per cent. of the total weight.

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ADMIRAL LORD JELLICOE was cheering last week in his remarks upon the doom of the submarines, but whilst appreciating the many and stupendous difficulties which have to be overcome in countering these sea-vermin, we cannot help thinking that there could be some means evolved of closing one of the channels by which the U-boats are able to dodge our hunting craft. The submarine, said Lord Jellicoe, sank a ship, and we got our craft on to her. That was the first intimation we had of the enemy's presence. We hunted it down, and it stayed at the bottom until the troubles were over, when aircraft which had hunted her had to go back to port to refuel. The turn of the submarine came again, and it continued on the pirate's career. That was one of the main difficulties in that locality. She might stop there for 48 hours, or she might came up again in some other portion of the Irish Sea.

ASSUMING that our aircraft are able to follow the sub.'s movements, surely with wireless and what not there should be no inherent difficulties in organising relays of air spotters to take up the work in good time, before the petering out of the fuel of the first patrol.

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FOLLOWING the recent Hun air-raid on Paris, quite a rush of French insurance business resulted to the London market, shopkeepers especially favouring our British methods. This without doubt is due to there being no insurance scheme in operation by the French Government similar to our national air-raid damage insurance policies, which resulted from "FLIGHT'S" persistence, starting away back in September, 1914.

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Apropos the outrage by the Huns upon our two flying officers whom they have seen fit to condemn as criminals for distributing under orders some pamphlets setting out a few home truths for the German people's consumption, but of an unpalatable nature to the Hohenzollern brood, this method of propaganda was even with this war no innovation to the Hun rulers. We are reminded, by the turning over the leaves of an old album, of these methods employed in the Franco-Prussian war at the Siege of Paris in 1870, when the Germans by means of balloons dropped leaflets into the beleaguered city calling upon the starving inhabitants to agitate against the authorities in persisting to maintain a useless resistance.

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THIS reminder was but a side-thought of a vivid remembrance of the balloon post from Paris and pigeon-post into Paris during the days of this memorable siege. Before us now lies a letter received by balloon-post from a relative, then confined within the German cordon encircling Paris, and on the same album page are a couple of photographic reminders of the same period and methods of communication with the outside world. The one, a pigeon's "letter," which is reprinted on this page, is a photographic reproduction of

The Times.

the front page of the *Times* of January 19th, 1871, conveyed into Paris in this form, attached to the "homing" pigeon. The minute photographs of the pages of the *Times* were there magnified by means of a magic lantern, and transcribed by clerks for the information of those it concerned, and thus the news of the day from the outside world was communicated to the besieged.

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THE return in kind was the despatching, at propitious times, of balloons conveying letters, newspapers and photo-

LA CLOCHE

graphic reproductions of newspapers, &c., of which latter we give a sample in the front page of *La Cloche* of November 30th, 1870.

* * *

As a matter of interest it may be recalled that 54 balloons were despatched from Paris during the siege of that City by the Prussians, 1870-71.

They carried 2,500,000 letters weighing about 10 tons.

Five private balloons also left Paris.

The first balloon, the "Neptune," left Paris on September 23rd, 1870.

On October 7th Gambetta escaped by the "Armand Barbes," taking with him a flock of carrier pigeons.

The last balloon which left Paris was the "General Cambronne" on January 28th, 1871.

The "Jules Favre" balloon left Paris November 30th; is supposed to have been lost at sea, as it has never been heard of since.

Four balloons were captured by the Prussians.

MR. E. SULLIVAN, from the Reform Club, writes that the war has produced many new words. Why not another—to get rid of the lengthy phrase "drive down out of control," as applied to aircraft? "To decontrol," verb active, would seem to meet the case.

We don't doubt but there is sufficient activity already about the "D" which the "decontrollee" gives vent to when in the process of getting out of his troubles, to more than justify its incorporation as a recognised symbol in "aircraft language."

* * *

KENSINGTON'S War Savings effort last week had, amongst its arrangements, the bombing by a naval airship of the Royal borough with War Saving circulars.

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NOTE that the Imperial War Exhibition at the Royal Academy, where there is so much to interest each and every citizen whether in the least concerned or whether entirely unconnected with matters aviatic, closes on February 24th.

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AT Pau a commemoration ceremony, attended by both British and French officers, has just again been held in honour of Wilbur Wright's first flight there in February, 1909.

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FROM New York information is stated to be forthcoming, from those claiming to have a knowledge of inside facts in Germany, of the transference underground of the great Krupp gun works at Essen, as a consequence of the news of America's great aerial fleet, which is to make such extended raids upon this hive of war munitions. Somehow we fancy the new locale is more likely to be Westphalia than the dug-out suggested.

* * *

AT the "Speed" lecture, to be given by Lieut.-Colonel Mervyn O'Gorman at the Women's Institute, 92, Victoria Street, at 3 p.m. on Friday this week, the chair will be taken by Mrs. Prothero, wife of the Rt. Hon. Roland Prothero, M.P.

* * *

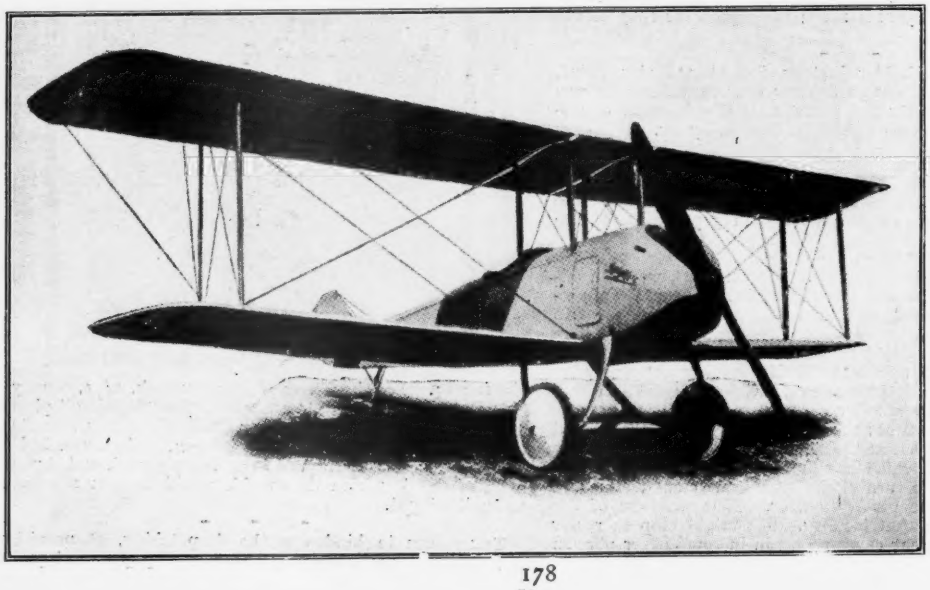
THOSE "super" Gothas about which there has been a good deal of camouflage recently, are said to have been on trial in both the last London and Paris raids. Several have, it is said, recently been tested from Friederichshafen, so we may expect in this country some unloading of fairly hefty eggs during the coming raiding season.

* * *

THE "Central European Conference on Air Law" is looking ahead, as at its recent meeting it adopted some interesting regulations for tariffs on goods transported through the air. It was decided that these should be subject to the same Customs duties as wares carried by rail or water. Aeroplanes and airships carrying cargoes are required before their ascent and after landing to subject themselves to examination for Customs purposes. Goods carried on a non-stop flight will be duty free.

* * *

JUSTLY, commendation to several firemen for saving lives at a fire caused by bombs dropped from enemy aircraft in the January 29th raid, is a feature of the "Orders" on February 11th issued by the London Fire Brigade.



A Dutch Aeroplane.—A military tractor scout produced by the well-known Spyker motor car firm at Trompenburg, Amsterdam.

BRIGADIER-GENERAL LIVINGSTONE has put the military seal of recognition upon "Penguins," as the popular name of the Air Force members of the "W.A.A.C.'s."

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LORD MONTAGU OF BEAULIEU is again *en route* from Canada for India, where his activities will be taken up as Inspector of Aerodromes and matters akin. Lord Montagu had a second nasty experience on his sea journey to Canada, when the vessel in which he was travelling came into collision with another ship—fortunately with less disastrous consequences than those he experienced in the Mediterranean.

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"AN experience of three years attached to the R.N.A.S. impresses me more and more with the element of luck which befalls pilots in crashes."—Temp. Surgeon H. Graeme Anderson, R.N., in the *Journal of the Royal Naval Medical Service.*

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A GUIDE TO THE R.F.C.

By CORPORAL "VEE."

THE following definitions will enable the uninitiated to understand the new language which has grown up with the development of the Royal Flying Corps.

Aerodrome.—This is an illusion. When a pupil makes his first landing the aerodrome is a space of bumpy ground about fifteen yards square. When a mechanic has to start a refractory "prop" on the other side, it is a boundless area of mud and new language.

Aero Engine.—This is a petrol engine, which "cuts out," "konks out," "seizes up," and then goes back to the workshops.

There are two kinds of aero engines—The Gnome and the RAF.

The Gnome is out of date, and the RAF can't help it.

Aeroplane.—Well, if you don't know what an aeroplane is, you had better see one of our latest films in which an early Wright machine carries spy despatches in the present war!

Bumpy.—The air is bumpy, or "perfectly ——" (you know!) when a pupil side-slips on a bank, or breaks his undercarriage on landing.

"*Bobbing.*"—This means that, if the sergeant-major calls you a special kind of fool, you agree with him, and pick up the cigarette which he dropped while he was paying you compliments.

Camel.—An aerial acrobat, and the salvation of rotaries! N.B.—The Huns get the "hump" when they see it.

Dual.—A state of complete disagreement between an aviation pupil and his instructor.

Fitter.—A fitter is a man who borrows tools from the riggers. He gets his name from the fact that, he can fit more tools and spare parts in a tool-box than any other member of the R.F.C.

"*Hoogeboo,*" "*gauget,*" *and* "*doings.*"—These are master words for all men with a limited vocabulary They are applied to anything from a new recruit to a special sighting for a machine gun.

(Some mechanics have been known to resent being called "hoogeboos!")

Longhorn.—Words fail me! It isn't *really* a bird-cage and the British Museum isn't large enough to hold it as a relic; so we'll leave it floating aimlessly in the air. If it can't get down, we'll send the gunner up to shoot it.

Medical Officer.—This gentleman is an uncertain quantity. When you are really "tired," he will prescribe medicine and duty; but when a man wants some time off in order to show his girl round the aerodrome he will send him to bed!

N.C.O.'s.—These are like Shakespeare's first five stages: The first is the Acting Corporal, "mewling and puking" in the S.M.'s arms.

The next, the Corporal—a man (or boy) of wonderful dignity and expert knowledge. He *knows*—so there's an end of it!

The third is the Sergeant. He moves in a higher plane, and sits in the stalls. He makes fierce love, and handles treasury notes with a blasé "I've-plenty-more" sort of style, which takes away the breath of the second A.M.'s.

The Flight-Sergeant is an uncomfortable sort of brute. He has reached the stage when he *might* become a Sergeant-Major, and this is such a disturbing thought to him, that a strong breeze accompanies him wherever he goes.

I'm a bit frightened now! I've reached the Sergeant-Major. He is IT. Everybody laughs at his jokes, and everybody quails at his frown. He feeds on fat chicken —or rather his what-is-it is "with good capon lined" and the C.O. has a sneaking fear of him. (I'm switching off here, before I get into trouble.)

"*Posh.*"—Another word of limitless possibilities. This time descriptive. A "stunt" pilot is "posh;" the latest

"*British Official.*"

An R.F.C. Bombing Squadron on the British Western Front.—Fixing electrical foot-sole and glove heating apparatus as a preliminary to a night bombing trip.

thing in scouts is "posh"; a floury potato is "posh"; a pretty girl with short skirts and nothing in particular for a blouse, is "posh." (Warning: A corporal is *never* "posh.")

"*Quirk.*"—A fierce, rakish-looking terror of the air! A dealer of fire, fury and flame! I think that is enough to give you an adequate conception of a "*Quirk!*"

Rigger.—I am not quite sure whether a rigger is a grease merchant, or second man to a fitter. Of course, he knows a thing or two, and his unerring verdicts about "wash in" and "wash out" (particularly "wash out") are quite beyond the ordinary mechanic.

Stores.—A mythical haven of rest for N.C.O.'s. If a sergeant is missing for twenty minutes, he is "at the stores" and the Flight Commander commends him for attention to details!

In addition to its capacity as a "legitimate excuse," it also contains spare parts for "Fords," and lots of mysterious people who issue tin-tacks for split-pins!

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THE AGO AND A CRITICISM.—A few weeks ago we published an original illustrated description of one of the Hun aeroplanes—to wit, the Ago. Descriptions of this character naturally promote progress and invite criticism, whether expressed to us or not. Whenever we find we are unable to improve upon any remarks sent in, or that, like the costermonger whose barrow of eggs being upset was dumb, by reason of "words not being ekal to it," we just pass it along for our readers to digest. The following comes within the latter category, and emanates from an R.N.A.S. flying station. If any "FLIGHT" reader wishes to "counter-attack" with some equally enlightening criticism we reserve to ourselves the option of not continuing this correspondence. The following is the communication, received under date January 7th:—

"Noticeing in a copy of 'FLIGHT' Dated Dec. 13th, 1917, illustrations and details of a captured German machine called the Ago, it struck me that your writer missed the dominant points. I suggest a few.

"1. Construction on same principle as propeller, fishing-rod, billiard cue or crane.

"2. Longer incidence next to *fuselage* gives better bearing for greatest weight.

"3. Absorbs viabriation which takes place nearest to engine.

"4. Gives greater controll over the material of which the machine is constructed. This means much weight rests where it can be fixed instead of hanging down at distant points, where it cannot be supported except by great strains on cables and wires. These are increased by the jolting that takes place in taxying and landing, but stops directly any speed is obtained, but others commence near the *fuselage* caused by the weight of engine, petrol, pilots, &c. Designers overcome this by thicker cables at the inner bays, but this still leaves unnecessary weight and thickness placed where it can exert the greatest drag. It makes the best of a bad job.

"5. It is an extension of the tapered wing tips, places support where it is needed instead of transferring it from distant points along flying wires, attains finality, in strength and efficiency, with its wings massive swelling bases.

"6. The only way to grasp its significance is to reconize that the Agoes designer utilises the supreme constructors experience. He copys the birds wing across the width and along its length. When Germans do this it is wise for Britishers not to ignore it. Watchfull."

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TEN YEARS AGO.

Excerpts from the "Auto." ("FLIGHT's" precursor and sister Journal) of February, 1908. "FLIGHT" was founded at the latter end of 1908.

THE CHAMBRE SYNDICALE IS FORMED.

As the outcome of the various conferences on the subject which we have chronicled in recent issues, the Automobile Club de France has definitely formed a special section to deal with the aeronautical industry, which section—known as the Chambre Syndicale des Industries Aeronautiques—will work amicably with the Aero Club de France. Its primary object is to encourage the industry as distinct from the sport; to which end it will hold competitions for engines suitable for aeronautical machines. The Marquis de Dion has been elected President, with MM. Mallet, L. Godard, and L. Blériot as Vice-Presidents. The General Secretary is M. G. Besancon, and the Treasurer M. Esnault-Pelterie.

THE BERTIN HELICOPTER.

A helicopter machine has just been completed by M. Bertin, its chief peculiarity being two lifting-screws on separate vertical shafts and a 150 h.p. 8-cylinder horizontal engine to drive them. The engine is situated in the centre of a tubular steel framework, and drives the vertical shafts through bevel-gearing. A continuation of the crank-shaft is also fitted with a screw tractor for the purpose of obtaining longitudinal motion when the machine itself is in the air. The two lifting-screws are situated at a height of about 1.8 metres above the base of the machine, and measure 2.4 metres diameter. They are designed to run at a speed of 1,200 r.p.m. The complete machine weighs 310 kilogs.

THE COLLOMB FLAPPING FLIGHT MACHINE.

An extraordinary apparatus has been constructed by M. Collomb, of Lyons, with the object of achieving flight on the flapping wing principle. The moving planes, of which there are two, rock upon fulcrums and are so hinged together that they can be operated simultaneously by the engine. The engine, which is mounted low down in the main framework, has a chain pulley on each end of its crankshaft, and these drive very long chains, which are supported by corresponding pulleys overhead. Anchored to each chain is one end of a long wooden connecting rod, the other ends of which are attached to the hinge between the two planes above. When the chains are in motion they carry the connecting rods bodily with them, and these impart a reciprocating motion to the flapping planes, which consequently rock about their fulcrum points. The greater portion of the surface of the planes is formed by pivoted louvres arranged after the manner of laths in a Venetian blind. These laths automatically close on the down-strokes and open to let the air freely through them on the up-strokes, and the inventor of the machine confidently anticipates being able to keep himself aloft in the air by this means. The stretch of the wings measures 12 metres, the total surface is 24 sq. metres. The engine is rated at 40 h.p.

General-Lieutenant von Hoeppner, the Commander General of German aircraft, in consultation with his Chief of Staff, Oberst-Lieutenant Thomsen.

FLIGHT
& AIRCRAFT ENGINEER

Casualties.

Second Lieutenant HUMPHREY EAMES BARWELL, R.F.C., who was killed while flying abroad on February 3rd, aged 19, was the youngest son of William and Emily Compton Barwell, 26, George Road, Edgbaston.

Flight Sub-Lieutenant NORMAN BLACK, R.N., whose death was officially reported last month, was the younger son of Mr. and Mrs. William Black, of 69, Hamilton Road, Reading. He was educated at Christ's Hospital, entering by competition at the age of 12; he rose to the high position of Senior Grecian and captain of the school in 1915, and in December of that year gained an open exhibition for Classics at St. John's College, Oxford. He was also captain of the cricket XI, and a member of the football XV. He obtained a commission in the R.N.A.S. direct from the school, and after the usual period of training, was appointed an instructor. At his own request he was transferred to the fighting squadrons in the autumn of 1917. He was reported by the Admiralty as missing on October 11th, and after an interval of two months his parents received a letter from the Swiss Red Cross saying that he had died of wounds behind the German lines at Wynendaele (between Ypres and Bruges) on October 12th, and was buried in Wynendaele cemetery.

Lieutenant JOHN HAY CALDWELL (previously reported missing, now reported killed in action) was the only son of Mr. W. H. Caldwell, of Morar, Inverness-shire, and was in his twenty-fourth year. He obtained his commission in the Cameron Highlanders in July, 1915, transferring to the Royal Flying Corps in May, 1917.

Lieutenant PERCY GRANT CAMERON, R.G.A., attached R.F.C., who was previously reported missing on August 14th last, and now reported killed in action on that date, was the youngest son of the late John Cameron, M.D., Lochgilphead, Argyllshire. His age was 25.

Second Lieutenant H. T. GARRETT, R.F.C., who was reported missing last May, has not since been heard of. He was the elder son of the late Mark Garrett, J.P., of Retreat, South Africa. He was educated at the Wynberg High School. After matriculating he joined the Civil Service, but relinquished his post to join the forces. He left at Retreat a large well-organised troop of Boy Scouts, which he and his brother had formed, and of which he was appointed scout master. His younger brother, Second Lieutenant E. T. Garrett, South African Infantry, is at the front, and last week he received news of the death of his father.

Second Lieutenant NORMAN WILLIAM GOODWIN, Middlesex Regiment, attached R.F.C. (formerly Lieutenant 25th County of London Regiment (Cyclists)), who, missing since September 16th, 1917, has now been reported killed in aerial action on that date, was the younger son of the late William Goodwin and of Mrs. Goodwin, 13, Blenheim Gardens, Cricklewood, N.W.

Captain the Hon. HAROLD ALFRED VYVYAN ST. GEORGE HARMSWORTH, M.C., Irish Guards, eldest son of Lord Rothermere, died on February 12th of wounds received in the battle of Cambrai. He was born in 1894, and was educated at Eton and Christ Church, Oxford. At Eton, where he was in Mr. Brinton's house, he took prizes in science, history, and divinity, including the Rosebery history prize. He was a promising boxer, and won the school welter weights. Later, when he was at Christ Church, Oxford, he gained his blue for boxing, and represented the University against Cambridge in 1914. He joined the Irish Guards a few days after the outbreak of war, and went to the front in December, 1914. Captain Harmsworth was held in affectionate esteem by the officers and men of the battalion with which he fought and fell. When, after being severely wounded in 1915 (it was his second wound), and recovering from an attack of trench fever, he was appointed to Lord French's staff in London, his great desire was to be back in the trenches, and as soon as he was fit for active service he insisted upon resigning his Staff appointment, and returned to his battalion in the field. He went back to France for the third—and last—time in August of last year. Captain Harmsworth was awarded the Military Cross six weeks ago, when in hospital. Lord Rothermere's second son, Lieutenant the Hon. Vere Harmsworth, R.N.V.R., was killed on November 13th, 1916, while serving with the Royal Naval Division. His only surviving son is Lieutenant the Hon. Esmond Harmsworth, R.M.A.

Information received in London states that Captain HARALD HEWETT, M.C., Royal Berkshire Regiment, attached R.F.C., has been killed in action. He was the eldest son and heir of Major Sir Harald George Hewett, Bt., R.G.A., and of Lady Hewett, Newbury, Berkshire. Born in 1892, he passed through Sandhurst, got his commission in the Berkshire Regiment, in February, 1915, and joining the R.F.C., became flight commander in February of last year. Captain Hewett's distinguished service had won for him the Military Cross. His father, Sir Harald, is the fourth holder of the baronetcy, to which the heir is now the second son, George, who during the present hostilities had served in Bowker's Horse in East Africa. He is 22 years of age. The first baronet, Sir George Hewett, G.C.B., was commander-in-chief of the forces in India, and subsequently in Ireland, and got his baronetcy in 1813.

Second Lieutenant DARG LAING, R.F.C., who has been killed, aged 20, was the only child of the late John Laing, of Crossing, Berwickshire, and of Mrs. Laing, of Eskbank, Dalkeith. He was educated at Loretto, and entered the Royal Military Academy, Woolwich, nearly two years ago, but was prevented by an injury to the knee from completing his training there. He received his commission in the R.F.C. last July.

Second Lieutenant FRANCIS ALEXANDER LEWIS, R.F.C., who was killed in action on February 5th, aged 25, was the second son of Mr. and Mrs. James Lewis, of The Priory, Larkhall Rise, Clapham. He had seen three and a half years' active service.

Information has been received through the International Red Cross, Geneva, that Captain ALLAN HIGSON SMITH, R.F.C., was killed on August 21st, 1917 (the day he was reported missing). Captain Smith was on Salisbury Plain with the Manchester University O.T.C. at the outbreak of war, and at once offered his services. He joined the Lincolnshires as a private, and was given a commission in a battalion of that regiment. In May, 1915, he transferred to the Royal Flying Corps, flying almost daily for ten months over the Somme in 1916. For brilliant artillery observing he was given the Military Cross and made flight-commander. Captain Smith was for a time commandant of an aerial gunnery school in France. The gallant officer was the youngest son of Mrs. Higson Smith, Grimsby. He was preparing for the engineering profession, and had gained his degree B.Sc., Manchester University.

The death by drowning at sea on January 31st is announced of Commander DAVID DE BEAUVOIR STOCKS, D.S.O., R.N., aged 33, the husband of Mrs. De Beauvoir Stocks, whose flying in the early days of aviation will be remembered by many of our readers. Commander Stocks was the only son of Mr. J. W. Stocks, of Baboolbonah, Beckenham. He became a Midshipman in May, 1900, and has served with distinction in the war. He was awarded the D.S.O. in November, 1915, for his services when in command of a submarine in the Sea of Marmora, where he made a prolonged cruise in spite of adverse conditions, and succeeded in inflicting much damage on the enemy. He was promoted, Commander in the following December, and in April, 1916, was decorated Chevalier of the Legion of Honour. Mrs. De Beauvoir Stocks is the youngest daughter of the late Captain Ernst, D.L., J.P., of Westcombe, Evercreech, Somerset.

Lieutenant EDWARD ARTHUR H. WARD, R.F.C., grandson of the late John Ward, formerly Chief Constable of Huddersfield, was killed on August 11th, 1917, at the front during his first flight as flight commander. He brought down an enemy machine in flames, and then went to assist a comrade. His commanding officer states he was last seen gliding into the clouds over the enemy lines. He was born in Leeds in 1896. In 1914, he won a mathematical scholarship for five years at Hertford College, Oxford, from the Huddersfield College Secondary School, of which he was captain. He enlisted in October, 1915, and was appointed second lieutenant in the 6th West Yorkshire Regiment. He joined the R.F.C. at the end of 1916.

Lieutenant WILFRID RANDALL CLARKE, R.F.A., attached to R.F.C., who was accidentally killed whilst flying on February 4th, aged 26, was the elder son of R. Feaver Clarke, J.P., Gravesend, aged 26 years.

Captain CLIVE FRANKLIN COLLETT, M.C., R.F.C., was accidentally killed on December 23rd, while flying in Scotland. Born in 1887, he was second son of Mr. Horace Edwin Collett, of Tauranga, Auckland, New Zealand, and came over shortly after the outbreak of war and joined the R.F.C. in March, 1915. In the same year he saw several months of active service in France, but a serious accident which occurred while he was bringing a machine to England prevented his flying for a long period and caused him injuries from which he was always troubled afterwards. In spite of this, he insisted on flying again, and in August, 1916, was given command of a flight. For the rest of that year and for the greater part of 1917 he was engaged in experimental work, for which his experience and ability as an engineer (his profession before the war) and his great skill as a pilot made him especially useful. In September, 1917, he again went to France, and of this short period his late commanding officer writes :—"Captain Collett served under my command in France, for some two months. During this time he himself accounted for fifteen enemy machines, all of which were confirmed. His devotion to duty was officially recognised during this period by the reward of the Military Cross and Bar."

Cadet JAMES ROBERT DUNCAN DUNDAS, R.F.C., who died on February 1st at the Canadian Military Hospital, Hastings, aged 18, was the only son of Robert Napier Dundas, of Inchgarvie, Kelowna, British Columbia.

Lieutenant ESMOND, son of ISABEL and SYDNEY O'HANLON, Hale, Cheshire, died on February 3rd at the Australian Auxiliary Hospital, Dartford, as the result of an accident when flying the previous Tuesday.

Probationary Flight Officer WILLIAM ERIC FLOYD, R.N., who was killed in a flying accident on January 21st, in his 19th year, was the elder son of Dr. and Mrs. W. R. Floyd, of Devonshire Road, Birkenhead. He was educated at Birkenhead school, where he was a school prefect, captain of the cricket XI, captain of the football XV, and captain of Fives. He was also head of the house in his last year. He was an athlete of great promise, and had taken a prominent part in several of the public school Rugby football games, and was regarded as a player with a great future before him. He left school in July, 1917, and in September joined the R.N.A.S., and had nearly finished his training when the fatal accident occurred.

Second Lieutenant ASHTON MORGAN, R.F.C., who died on February 4th as the result of a flying accident in England, aged 26 years, was the eldest son of Mr. and Mrs. Ernest Morgan, 44, Westside, Wandsworth Common.

Second Lieutenant PETER HENRY OLDRIDGE, R.F.C., who was accidentally killed in Huntingdonshire on January 26th, aged 19, was the only son of Mrs. Oldridge, 40, Hillside Road, Mossley Hill, Liverpool, late of Headingley, Leeds.

Second Lieutenant EVELYN JEFFREYS PEACOCKE, R.F.C., who died on February 4th at Tidworth Hospital, the result of a flying accident, aged 18, was the younger son of Mrs. Swinburne.

Lieutenant HERBERT SIMSON, R.F.C., who was born in New Zealand, was the youngest son of Mr. and Mrs. Hector Norman Simson, of New Zealand. His three brothers are Captain Donald Simson, who served in Gallipoli; Lieut. Hector Simson, South African Forces; and Corporal Rupert Samson, N.Z. Field Artillery. He was returning to New Zealand when he died at sea on January 24th.

Second Lieutenant T. M. SPEECHLY, attached to the R.F.C. (killed last week in an aeroplane accident), was the eldest son of Mr. T. and Mrs. Speechly, Uttoxeter. He was gazetted to the 5th Reserve Regiment of Cavalry in December, 1916. He was 21 years of age.

Second Lieutenant JOHN STEVENSON YOUNG, R.F.C., who was killed in an aeroplane accident in Scotland, on February 3rd, was the only surviving son of the late John Young, Coalmaster, Crosslynne, Bearsden, near Glasgow, and of Mrs. Young, Marston, Bearsden.

Missing.

Lieutenant CYRIL BALL, the only remaining son of Alderman A. Ball, Nottingham, is officially reported missing. Like his V.C. brother, Cyril was in the R.F.C., to which he was transferred from the Sherwood Foresters. He was out in France for a third period, and was flying on Tuesday last week when he attacked the enemy. Since then nothing has been heard of him. He joined the Army at 17, and is now 20.

Second Lieutenant JOHN MILNE MILNE HENDERSON, R.F.C., who is reported missing, was trained as an engineer, and was for some years in the City of Edinburgh (Fortress) Royal Engineers before the war broke out. A year ago he transferred to the R.F.C. He was educated at the Royal High School of Edinburgh, and took part in all school sports, winning distinction as a swimmer and boxer. His brother, J. Y. Henderson, the well-known Rugby International football player, was killed in action six months ago. Two other brothers are in the Army, one a major in the R.E., and the other a lieutenant in the R.F.C. His father is a well-known Edinburgh banker.

Married.

On January 26th, at the Chapel Royal of St. Peter and Vincula, Tower of London, Second Lieutenant GEORGE ALEXANDER FENNIMORE, R.F.C., second son of E. H. Fennimore, Esq., of The Bastion, Tower of London, was married to DOROTHY TEAGUE, only daughter of Lieut.-Col. and Mrs. R. COLE, The Devereux Tower, Tower of London.

On Tuesday, February 5th, at St. Peter's, Cranley Gardens, Lieutenant W. CARMICHAEL GIBSON, Hants Regiment, attached R.F.C., was married to MAUDE, daughter of ROGER BUSTON, Combe House, Chard.

On February 2nd, by special licence, Lieut. SELWOOD HYDE HEWETT, R.F.C., youngest son of the late Harry Hyde Hewett and Mrs. Hyde Hewett, was married to LAVINIA FRANCES MARY, daughter of the late MICHAEL EUGENE TOOMEY and Mrs. Toomey, of Ealing, W.

On February 6th, at the Brompton Oratory, Second Lieutenant WALTER A. MERRILL, R.F.C., of Montreal, was married to ANNIE L. HUDSON, daughter of the late G. B. Hudson, of Frogmore Hall, Herts, and Mrs. Hudson, of 34, Gordon Road, Ealing, W.

The marriage took place on February 7th, at the Chapel Royal, Savoy, of Flight Commander W. GEOFFREY MOORE, D.S.C., R.N., second son of the late W. H. Moore and of Mrs. Moore, of Woodfield, Malvern Wells, and Miss HAYDEE BECKER, eldest daughter of Mr. and Mrs. Fred Becker, of Sutton Hall, Heston, Hounslow, and Don Cottage, Aberdeen.

On February 9th at the Parish Church, Reigate, Captain REGINALD JAMES SANCEAU, R.F.C., only son of Mr. and Mrs. Sanceau, "Rokesby," Horley, was married to MARJORIE MARY, younger daughter of Mr. and Mrs. RUTHERFORD, "Fairholme," Millway, Reigate.

On February 6th, 1918, at St. Leonard's Church, Misterton, Captain CAMPBELL THOMAS SANCTUARY, R.F.A., attached R.F.C., eldest son of Mr. and Mrs. C. F. S. Sanctuary, of Mangerton, Melplash, Dorset, was married to ELIZABETH BARBARA, elder daughter of Mr. and Mrs. R. M. P. PARSONS, of Misterton, Somerset.

To be Married.

The engagement is announced between Captain ALAN P. MACLEAN, Canadians, attached R.F.C., and KATHLEEN FERNIHOUGH, daughter of Mr. and Mrs. Thomas F. AGAR, Gayton, Parkside, Wimbledon Common, S.W.

A marriage is arranged, and will take place on February 25th at 2, at St. Mary Abbott's Church, Kensington, W., between Captain SIDNEY ROBERT STAMMERS, R.F.C., eldest son of Mr. and Mrs. S. J. R. Stammers, of Beaconsfield, Gunnersbury, W., and MURIEL, only daughter of Mr. and Mrs. H. G. MUSKETT Montrose, Gerrards Cross, Bucks.

A marriage has been arranged, and will shortly take place between Lieutenant-Commander CECIL N. R. WRIGHT, R.N.V.R., son of Mr. and Mrs. Francis H. Wright, of 7, Addington Road, Reading, and MARGARET, widow of the late Squadron-Commander HEW DALRYMPLE CLARK, R.N.A.S., and daughter of Mr. and Mrs. H. L. Savory, of 31, Bramham Gardens, S.W.

Items.

The will of Major MAURICE ADAM BLACK, Dragoon Guards, attached R.F.C., of Eastbourne, formerly of Dublin, son of the late Adam William Black, of Edinburgh, who represented Cambridge University at Rugby football in 1898 and 1899, and his regiment in all inter-regimental polo tournaments, killed on active service, has been proved at £66,980.

The estate of Captain ARTHUR TYLSTON GREG, Cheshire Regiment, attached R.F.C., killed in action, intestate, has been declared at £3,101.

The estate of Second Lieutenant ROBERT ANDERSON INGLIS, R.F.C., of Sefton Drive, Liverpool, who was killed in France on September 21st, and died intestate, has been sworn at £24,640.

FLIGHT

INTERNATIONAL AIRCRAFT STANDARDS.

(*Continued from page* 162.)

4P2—Specifications for Aircraft Ferrules and Thimbles.

GENERAL.—1. The general specifications, 1G1, shall form, according to their applicability, a part of these specifications.

MATERIAL.—2. Thimbles shall be manufactured of I.A.S.B. standard No. 1010 steel sheet, cold rolled and annealed. Ferrules shall be manufactured of the same steel as is used for the wire, namely, I.A.S.B. standard steels No. 1065, No. 1070, or No. 1080.

MANUFACTURE.—3. (*a*) Steel wire for winding into ferrules shall be uniformly coated with pure tin to solder readily.

(*b*) All thimbles shall be smoothly and evenly electro-galvanised.

DIMENSIONS AND TOLERANCES.—4. (*a*) Ferrules and thimbles shall conform within limits specified to the dimensions given in the tables and drawings.

(*b*) The manufacturer shall provide hardened pin gauges for all sizes of thimbles and ferrules and such gauges, after being approved by the Government, shall be used by the inspectors for determining all internal dimensions and shapes.

DELIVERY, PACKING AND SHIPPING.—5. (*a*) Ferrules and thimbles shall be packed and shipped in fibre or pasteboard boxes containing 1,000 each.

(*b*) A label on each box shall be marked with order number or other distinguishing marks, size, material, evidence of inspection, &c., as required.

INSPECTION AND REJECTION.—6. The inspector shall examine one sample taken at random from a box of 1,000 ferrules or thimbles and determine whether it conforms to these specifications.

I.A.S.B. STANDARD TINNED STEEL AIRCRAFT FERRULES.

ENGLISH UNITS.

American Wire Gauge (B. & S.)	A and B. Inch.	D. Inch.	E. Inch.	Approximate weight, 1,000 pieces. Pounds.
8	0.128	0.130	0.260	34.50
9	.114	.116	.232	23.00
10	.102	.104	.208	17.00
11	.091	.093	.186	11.75
12	.081	.083	.166	8.50
13	.072	.074	.148	6.03
14	.064	.066	.132	4.50
15	.057	.059	.118	3.10
16	.051	.053	.106	2.09

METRIC UNITS.

American Wire Gauge (B. & S.)	A and B. mm.	D. mm.	E. mm.	Approximate weight, 1,000 pieces. kg.
8	3.25	3.30	6.60	15.65
9	2.91	2.96	5.92	10.43
10	2.59	2.64	5.28	7.71
11	2.31	2.36	4.72	5.33
12	2.05	2.10	4.20	3.86
13	1.83	1.88	3.76	2.74
14	1.63	1.68	3.36	2.04
15	1.45	1.50	3.00	1.41
16	1.29	1.34	2.68	.95

I.A.S.B. STANDARD GALVANISED STEEL AIRCRAFT THIMBLES.

ENGLISH UNITS.

Size. Inch.	A. Inch.	B. Inch.	C. Inch.	D. Inch.	E. Inch.	Approximate weight, 1,000 pieces. Pounds.
1/16 and 3/32	0.35	0.70	0.07	0.09	0.032	3.00
1/8	.35	.70	.07	.13	.032	4.34
5/32	.40	.80	.10	.17	.032	6.36
3/16	.50	1.00	.135	.21	.032	9.00
7/32	.60	1.20	.15	.24	.032	13.50
1/4	.70	1.40	.17	.25	.032	16.63
9/32	.80	1.60	.198	.30	.040	30.36
5/16	.90	1.80	.21	.33	.040	33.00
3/8	1.00	2.00	.26	.39	.060	74.00

METRIC UNITS.

Size. mm.	A. mm.	B. mm.	C. mm.	D. mm.	E. mm.	Appriximate weight, 1,000 pieces. kg.
1.59 and 2.38	8.89	17.78	1.78	2.29	0.81	1.36
3.18	8.89	17.78	1.78	3.30	.81	1.97
3.97	10.16	20.32	2.54	4.32	.81	2.88
4.76	12.70	25.40	3.43	5.33	.81	4.08
5.56	15.24	30.48	3.81	6.10	.81	6.12
6.35	17.78	35.56	4.32	6.35	.81	7.54
7.14	20.32	40.64	5.03	7.62	1.02	13.77
7.94	22.86	45.72	5.33	8.38	1.02	14.97
9.53	25.40	50.80	6.60	9.91	1.52	33.57

Dimensions A. and B (see Fig. 1) are minimum allowance + 0.002 in. (0.05 mm.).

The section of gauge bar having semi-circular edges, as shown in Fig. 2, shall pass through ferrules with a clearance of approximately 0.003 in. (0.08 mm.).

Tolerance on dimensions A (see Fig. 3) shall be + 0.01 in. (0.25 mm.).

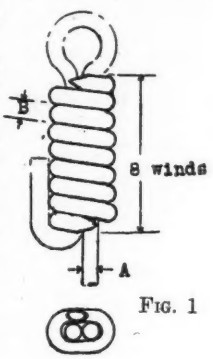

FIG. 1

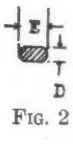

FIG. 2

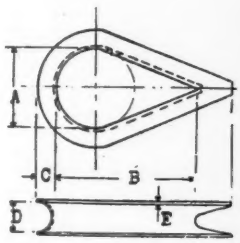

FIG. 3

3S23—Specifications for Medium Carbon Steel Tubes.

GENERAL.—1. The general specifications, 1G1, shall form, according to their applicability, a part of these specifications.

USE.—2. These tubes are suitable for stressed parts, such as braces and tie tubes.

MATERIAL.—3. The I.A.S.B. standard steel No. 1035 shall be used. Its composition is as follows :

	Per cent.
Carbon	0.30–0.40
Manganese	.50–.80
Phosphorus, maximum	.045
Sulphur, maximum	.050

MANUFACTURE.—4. (*a*) The tubes are to be of the cold-drawn seamless type.

Heat Treatment.—(*b*) The tubes shall be heat treated to give the physical properties specified. It is desirable that they be quenched in oil.

(*c*) Any tube may be rejected at any time because of injurious defects or faults in the steel which are revealed by manufacturing operations, notwithstanding the fact that it has previously passed inspection. Such rejected material shall be returned to the manufacturer at the latter's expense. This clause shall not apply to materials fabricated after export.

WORKMANSHIP AND FINISH.—5. The tubes are to be smooth, of the section specified, and within the permissible tolerances as to wall thickness, of uniform diameter, free from scale, dirt, specks, longitudinal seaming, lamination, grooving, and blistering, both internally and externally.

PHYSICAL PROPERTIES AND TESTS.—6. The tubes shall have the following physical properties :

Tensile Test.—(*a*)

Minimum tensile strength, 80,000 lb. per square inch (56.24 kg./mm.^{2}).

Minimum yield point, 60,000 lb. per square in. (42.18 kg./mm.^{2}).

Minimum elongation, either 20 per cent. in 2 in. (50.8 mm.), or 12 per cent in 8 in. (203.2 mm.).

Crushing Test.—(*b*) The test specimen shall be crushed endwise until the outside diameter is increased in one zone by 25 per cent., or until one complete fold is formed. The specimen shall stand this treatment without cracking.

SELECTION OF TEST SPECIMENS.—7. One test specimen for the tensile test shall be chosen from every 400 ft. (121.9 m.) of tubing and one test specimen for the crushing test from every 100 ft. (30.5 m.) of tubing.

The specimens for the crushing tests shall have a length of 1.5 times the diameter of the tube.

Whenever possible the selection of test specimens shall be made by heats.

DIMENSIONS AND TOLERANCES.—8. (*a*) The following tolerances will be allowed on the outside diameter of tubes :

Tubes under 1.5 in. (38.1 mm.) diameter, ± 0.003 in. (0.08 mm.).

Tubes over 1.5 in. (38.1 mm.) diameter, ± 0.005 in. (0.13 mm.).

The manufacturer and purchaser shall agree upon tolerances for coulissant or telescoping tubes.

(*b*) The variation in wall thickness may be 10 per cent. of the dimension specified.

(*c*) In no part of any tube shall the departure from straightness exceed 1 in 600.

DELIVERY, PACKING AND SHIPPING.—9. All tubes shall be well oiled and delivered in boxes not exceeding 220 lb. (100 kg.) gross weight.

3S21.—Specifications for Welded Steel Tubes.

GENERAL.—1. The general specifications, 1G1, shall form, according to their applicability, a part of these specifications.

USE.—2. These tubes are suitable only for unstressed parts, such as conduit tubes.

MATERIAL.—3. The I.A.S.B. standard steel No. 1020 shall be used. Its composition is as follows :

	Per cent.
Carbon	0.15–0.25
Manganese	.30– .60
Phosphorus, maximum	.045
Sulphur, maximum	.050

MANUFACTURE.—4. All tubes shall be of the welded type. They must be carefully annealed before the final pass.

Any tube may be rejected at any time because of injurious defects or faults in the steel which are revealed by manufacturing operations, notwithstanding the fact that it has previously passed inspection. Such rejected material shall be returned to the manufacturer at the latter's expense. This clause shall not apply to materials fabricated after export.

WORKMANSHIP AND FINISH.—5. The tubes are to be smooth, of the section specified, and within the permissible tolerances as to wall thickness, of uniform diameter, free from scale, dirt, specks, longitudinal seaming, lamination, grooving, and blistering, both internally and externally.

PHYSICAL PROPERTIES AND TESTS.—6. The tubes shall have the following physical properties :

Crushing Test.—One test specimen from every 100 ft. (30.5 m.) of tubing is to be crushed endwise until the outside diameter is increased in one zone by 25 per cent., or until one complete fold is formed. The specimen shall stand this treatment without cracking.

Whenever possible the selection of test specimens shall be made by heats.

The specimens for the crushing tests shall have a length of 1.5 times the diameter of the tube.

DIMENSIONS AND TOLERANCES.—7. (*a*) The following tolerances will be allowed on the outside diameter of tubes : Tubes under 1.5 in. (38.1 mm.) diam., ± 0.005 in. (0.13 mm.). Tubes over 1.5 in. (38.1 mm.) diam., ± 0.010 in. (0.25 mm.).

(*b*) The variation in wall thickness may be ± 10 per cent. of the dimension specified.

(*c*) In no part of any tube shall the departure from straightness exceed 1 in 600.

DELIVERY, PACKING AND SHIPPING.—8. All tubes shall be well oiled and delivered in boxes not exceeding 220 lb. (100 kg.) gross weight.

3S24.—Specifications for Alloy Steel Tubes.

GENERAL.—1. The general specifications, 1G1, shall form, according to their applicability a part of these specifications.

USE.—2. These tubes are suitable for axle and parts subject to shock.

MATERIAL.—3. The material for these tubes shall be chosen from I.A.S.B. standard steels listed below. The composition chosen shall be stated by the manufacturer, and is further limited as follows : Carbon, not over 0.35 per cent.

MANUFACTURE.—4. (*a*) The tubes are to be of the cold-drawn, seamless type. To avoid over hardening after annealing the tube wall shall not be reduced more than 20 per cent. in thickness in the final passes.

Heat Treatment.—(*b*) The tubes shall be heat treated to temper 1 or 2 as ordered. The quenching is to be done in oil.

(*c*) Any tube may be rejected at any time because of injurious defects or faults in the steel which are revealed by manufacturing operations, notwithstanding the fact that it has previously passed inspection. Such rejected material shall be returned to the manufacturer at the latter's expense. This clause shall not apply to material fabricated after export.

WORKMANSHIP AND FINISH.—5. The tubes are to be smooth, of the section specified, and within the permissible tolerances as to wall thickness ; of uniform diameter, free from scale, dirt, specks, longitudinal seaming, lamination, grooving, and blistering, both internally and externally.

PHYSICAL PROPERTIES AND TESTS.—6. The tubes shall have the following physical properties :

Tensile Test.—(*a*)

TEMPER 1.

Minimum tensile strength, 110,000 lb. per square in. (77.33 kg./mm.^{2}).
Minimum yield point, 90,000 lb. per square in. (63.27 kg./mm.^{2}).
Minimum elongation, 15 per cent. in 2 in. (50.8 mm.) or 5 per cent. in 8 in. (203.2 mm.).

TEMPER 2.

Minimum ultimate strength, 85,000 lb. per square in. (59.76 kg./mm.^{2}).
Minimum yield point, 60,000 lb. per square in. (42.18 kg./mm.^{2}).
Minimum elongation, 25 per cent. in 2 in. (50.8 mm.), or 10 per cent. in 8 in. (203.2 mm.).

Crushing Test.—(*b*) The test specimen shall be crushed endwise until the outside diameter is increased in one zone by 25 per cent., or until one complete fold is formed. The specimen must stand this treatment without cracking.

SELECTION OF TEST SPECIMENS.—7. One test specimen for the tensile test shall be chosen from every 400 ft. (121.9 m.) of tubing and one test specimen for the crushing test from every 100 ft. (30.5 m.) of tubing.

The specimens for the crushing tests shall have a length of 1.5 times the diameter of the tube.

Whenever possible the selection of test specimens shall be made by heats.

DIMENSIONS AND TOLERANCES.—8. (*a*) The following tolerances will be allowed on the outside diameter of tubes : Tubes under 1.5 in. (38.1 mm.) diam., ± 0.003 in. (0.08 mm.). Tubes over 1.5. in. (38.1 mm.) diameter, ± 0.005 (0.13 mm.).

The manufacturer and purchaser shall agree upon tolerances for coulissant or telescoping tubes.

(*b*) The variation in wall thickness may be ± 10 per cent. of the dimension specified.

(*c*) In no part of any tube shall the departure from straightness exceed 1 in 600.

DELIVERY, PACKING AND SHIPPING.—9. All tubes shall be well oiled and delivered in boxes not exceeding 220 lb. (100 kg.) gross weight.

When electric or crucible furnace steel is specified in the order, the maximum allowable percentages of phosphorus and sulphur may, at the option of the purchaser, be limited to 0.03 per cent.

CHEMICAL COMPOSITION OF STANDARD ALLOY STEELS.

NICKEL STEELS.

No.	Carbon.	Manganese.	Phosphorus, maximum.	Sulphur, maximum.	Nickel.	Chromium.
2320	.15– .25	.30– .60	.040	.045	3.25–3.75	.....
2325	.20– .30	.50– .80	.040	.045	3.25–3.75	.....
2330	.25– .35	.50– .80	.040	.045	3.25–3.75	.....

CHROMIUM VANADIUM STEELS.

No.	Carbon.	Manganese.	Phosphorus, maximum.	Sulphur, maximum.	Chromium.	Vanadium, minimum,
6120	0.15–0.25	0.30–0.60	0.040	0.045	0.60–0.90	0.15
6130	.25– .35	.50– .80	.040	.045	.80–1.10	.15

(*To be continued.*)

Air Raid Perils.

Two decisions regarding air raid risks were given by His Honour Judge Roberts in a London County Court on February 7th. In the first case Mrs. Bird claimed £156 for the loss of her husband, a messenger. While he was in a building to which his employer had sent him on July 7th last a bomb dropped on the place, causing a fire. He died from suffocation.

His Honour said that death as the result of a bomb dropped from enemy aircraft was not sufficient in itself for the claim to succeed. There must be a special risk arising from a peril attached to the particular location in which, by the obligation of his service, the deceased was placed.

The warehouse to which he was sent ran no further risk of attack than any other building in the locality, but owing to the inflammable nature of the contents the risk of fire was materially increased, and consequently the risk of personal injury by fire to persons in the place was a special risk.

In the opinion of Judge Roberts there was a present and special risk of fire in this warehouse as compared with other buildings in the locality, and the fact that the fire was due to the act of enemy airmen did not alter the character of that risk. He held that the death was caused by an accident arising out of, as well as in the course of, the man's employment, and awarded the applicant the amount claimed.

In the second case Catherine Kuyveth, a widow, claimed compensation against some printers by whom her husband was employed as traveller and collector. On June 13th, while in the street on their business, he was killed by a bomb. Payments to the amount of £40 had been made.

The Judge held that the man's duty entailed no further or other risk than that which applied to all other persons in the street and vicinity. There was no question of a risk specially attaching to a locality, so the principle upon which a decision had already been given elsewhere was applicable, and his verdict must be for the respondents.

The British Air Services

"PER ARDUA AD ASTRA"

UNDER this heading are published each week the official announcements of appointments and promotions affecting the Royal Naval Air Service and the Royal Flying Corps (Military Wing) and Central Flying School. These notices are not duplicated. By way of instance, when an appointment to the Royal Naval Air Service is announced by the Admiralty it is published forthwith, but subsequently, when it appears in the* LONDON GAZETTE, *it is not repeated in this column.

Royal Flying Corps (Military Wing).

London Gazette Supplement, February 5th.

The following appointments are made :—

Flight Commander.—Lieut. H. J. Gibson, S.R., from a Flying Officer, and to be Temp. Capt. whilst so employed ; Jan. 15th.

Flying Officers.—Temp. 2nd Lieut. F. C. B. Wedgwood, M.G. Corps, and to be transfd. to R.F.C. Gen. List ; Jan. 2nd. Lieut. C. A. Pelletier, Canadian Engrs. ; Temp. Lieut. L. Macdonald, Gen. List, from an Equipment Officer, 3rd Class ; Jan. 3rd. Temp. Lieut. R. R. Harkus, M.C., K.O. Sco. Bord., and to be transfd. to R.F.C. Gen. List ; Jan. 5th. Lieut. W. J. Shorter, Essex R. (T.F.), and to be secd. ; Temp. 2nd Lieut. E. G. Brookes, attd. Worc. R., and to be transfd. to R.F.C. Gen. List ; Temp. 2nd Lieut. L. C. Jordan, attd. R. War. R., and to be transfd. to R.F.C. Gen. List ; Jan. 6th. Temp. Lieut. G. P. Morris, Gen. List, from a Flying Officer (Obs.), seniority from Sept. 5th, 1916. Lieut. B. Cockshott, Canadian Exped. Force ; Jan. 7th. Temp. 2nd Lieut. J. F. Starbuck, M.G. Corps, and to be transfd. to R.F.C. Gen. List ; Lieut. L. V. Southwell, Canadian Exped. Force ; Jan. 8th. 2nd Lieut. J. G. Cowell, R. Fus., and to be secd. ; Capt. J. N. H. Brooke, L'pool R. (T.F.), from an Asst. Instr. in Gunnery (graded as an Equipment Officer, 2nd Class) ; Jan. 9th. Lieut. J. T. M. Tylden-Wright, Hrs., from Res. R. of Cav., and to be secd. ; Jan. 11th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—W. E. Gilbert ; Aug. 19th, 1917. C. W. Davison, W. K. Swayze ; Sept. 1st, 1917. A. R. Knowles, L. M. Price ; Sept. 22nd, 1917. H. B. Bradley ; Nov. 16th, 1917. G. A. Whateley ; Nov. 23rd, 1917. A. G. Earle, N. C. S. Campbell ; Dec. 22nd, 1917. V. C. Kirtley ; Dec. 30th, 1917. F. H. Knobel ; Jan. 2nd. L. R. Evershed, C. E. Tylor ; Jan. 3rd. V. W. Hatton, W. Sidebottom ; Jan. 5th. A. J. Kilpatrick, R. J. Aitken, R. L. Leigh ; Jan. 6th. R. E. M. Worsley, A. J. Golding, R. S. Milani ; Jan. 7th. R. W. Weatherby, J. H. Summers, E. E. Biccard, G. H. Rogers ; Jan. 8th. F. N. Marchant, W. A. Smart ; Jan. 9th. J. F. C. de Vomecourt, F. G. McNeil, R. E. Bright ; Jan. 10th. The initials of Temp. 2nd Lieut. E. T. Jones, Gen. List, are as now described, and not as in the *Gazette* of May 30th, 1917.

Flying Officers (Observers).—Lieut. J. G. Richards, R.F.A., S.R., seniority from Oct. 3rd, 1917 ; Lieut. W. J. Blitch, Canadian Exped. Force, seniority from Oct. 25th, 1917. Lieut. E. J. Blackledge, L'pool R., and to be secd. ; Nov. 22nd, 1917, seniority from Oct. 25th, 1917. Temp. Lieut. H. Whitworth, Notts and Derby R., and to be transfd. to R.F.C., Gen. List ; Dec. 4th, 1917, seniority from November 6th, 1917. Temp. 2nd Lieut. R. W. Hobbs, S. Wales Bords., and to be transfd. to R.F.C. Gen. List ; Jan. 2nd, seniority from Nov. 11th, 1917. Capt. M. G. McL. Cahill-Byrne, Middx. R. (T.F.), and to be secd. ; Jan. 1st, seniority from Nov. 21st, 1917. 2nd Lieut. J. H. Corbet, Shrops. L.I., S.R., and to be secd. ; Jan. 3rd, seniority from Nov. 21st, 1917. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—G. J. Howells ; Nov. 22nd, 1917, seniority from Sept. 10th, 1917. A. E. R. Aldridge ; Nov. 29th, 1917, seniority from Sept. 24th, 1917. A. E. Thornhill ; Jan. 2nd, seniority from Nov. 4th, 1917 ; Jan. 1st.

Equipment Officers, 3rd Class.—Temp. Lieut. J. E. S. Long, Gen. List, from a Flying Officer ; Aug. 1st, 1917. Temp. 2nd Lieut. A. R. Butler, R.E. ; Dec. 14th, 1917. Temp. 2nd Lieut. C. B. Loweth, E. York. R., and to be transfd. to R.F.C. Gen. List ; Dec. 15th, 1917. 2nd Lieut. C. W. Bickley, Glouc. R. (T.F.), and to be secd. ; Dec. 26th, 1917. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—W. W. Winterbottom ; Sept. 13th, 1917. R. A. C. Cradock-Hartopp ; Nov. 15th, 1917. L. B. Mackinlay ; Dec. 3rd, 1917. W. J. Rose, G. P. S. Sanday, T. H. Baxter ; Dec. 26th, 1917. H. A. Lyford ; Dec. 27th, 1917. R. M. Duke ; Jan. 12th.

Schools of Instruction.—School of Technical Training.

Park Commander.—Qrmr. and Hon. Lieut. (Temp. Maj.) E. J. Parker, M.C., R.F.C., from 2nd in comd. (graded as a Brig.-Maj.), Offrs. Technical Training Corps, and to retain his temp. rank while so employed ; Dec. 11th, 1917.

General List.—Qrmr. and Hon. Lieut. (Temp. Maj.) E. J. Parker, M.C., relinquishes the rank of Temp. 2nd Lieut. on ceasing to hold the appointment of second in command of an Officers' Technical Training Corps ; Dec. 11th, 1917. Temp. 2nd Lieut. K. C. Campbell relinquishes his commn. on account of ill-health contracted on active service, and is granted the hon. rank of 2nd Lieut. (Feb. 6th) ; the surname of Temp. 2nd Lieut. N. Holroyde is as now described, and not as in the *Gazette* of Jan. 1st. Actg.-L.-Corpl. W. F. Hooper, from Yorks. L.I., to be Temp. 2nd Lieut. ; Nov. 14th, 1917. To be Temp. 2nd Lieuts. (on prob.) :—R. V. Middlemost ; June 29th, 1917. P. V. Moseley ; Dec. 4th, 1917. C. F. Sweatman, J. L. H. Thomson ; Dec. 17th, 1917. Cadet W. H. Poole ; Dec. 20th, 1917. Corpl. D. B. Gunn, from R.A.M.C. ; Jan. 16th. H. P. Greenhill, late 2nd Lieut., Gen. List ; Jan. 25th. The notification in the *Gazette* of Jan. 1st regarding Cdt. B. G. Pool is cancelled. Cadets to be Temp. 2nd Lieuts. (on prob.) :—H. G. Booth, H. P. Bennett, A. W. Baker, P. H. Burns, J. A. Bramley, W. H. Bentley, A. J. Bridge, A. R. Crosthwaite, D. P. Conyngham, E. D. Deck, F. E. Donkin, E. A. Dew, J. M. Evans, R. A. Fraser, J. R. Ferguson, C. E. Gardener, N. B. Harris, B. Hurdus, I. B. Hyslop, H. A. B. Jackson, R. F. Jarrom, C. S. Jefferson, T. James, G. D. Knighton, W. E. Mayne, F. H. McNay, A. H. McIntyre, E. M. Prowse, H. Thompson, P. Thornton, A. Todd, C. G. Smith, E. A. Welsford, F. Whitehouse, J. Watson, J. C. Watt, T. M. Bartlett, J. Birtwistle, E. Brittain, L. C. G. M. le Champion, J. W. Murdoch, H. W. Robinson, E. W. Bragg, D. C. Cooney, G. H. L. Robertson ; Jan. 18th. The surname of H. H. Riekie is as now described, and not as in the *Gazette* of Dec. 29th, 1916, and subsequent *Gazettes*.

Memorandum.—Sergts. from R.F.C. to be 2nd Lieuts.—H. Robinson (Jan. 3rd) ; H. Butler (Jan. 11th).

London Gazette Supplement, February 6th.

The following appointments are made :—

Staff Officers, 2nd Class.—(Graded as a Brig.-Maj.) :—Lieut. (Temp. Capt.) M. Nicholson, R.F.A. (T.F.), from the 3rd Class (graded as a Staff Capt.), and to be secd. ; Jan. 4th. 3rd Class.—(Graded as a Staff Capt.) :—Temp. Capt. J. T. North, Res. R. of Cav., and to be transfd. to Gen. List ; Jan. 4th.

Flight Commanders.—From Flying Officers :—Capt. A. J. Carlow, Cyclist Bn. (T.F.) ; Jan. 22nd. And to be Temp. Capts. while so employed :—Lieut. A. J. Mayo, S.R. ; Jan. 5th. Temp. 2nd Lieut. A. V. Milton, Gen. List ; Jan. 15th. Lieut. E. W. Monk, Lond. R. (T.F.) ; Jan. 19th.

Flight Commanders.

Flying Officers.—Temp. Lieut. H. F. Miller, attd. Linc. R., and to be transfd. to R.F.C. Gen. List ; Sept. 23rd, 1917. Lieut. H. B. Morkill, York. R., and to be secd. ; Oct. 13th, 1917. 2nd Lieut. P. B. Clews, Yeo. (T.F.), and to be secd. ; Oct. 20th, 1917. Lieut. H. H. Storey, R.E. (T.F.) ; Oct. 24th, 1917. Lieut. J. N. Garnett, R.F.A. (T.F.), and to be secd. ; Oct. 25th, 1917. Maj. C. A. Cutbill, Yeo. (T.F.) ; Oct. 26th, 1917. 2nd Lieut. M. M. Wilson, Bord. R. (T.F.), and to be secd. ; Oct. 27th, 1917. Lieut. C. H. Teagle, Wilts. R. (T.F.), and to be secd. ; 2nd Lieut. F. N. Whiteley, Ind. Army Res. of Officers ; Oct. 28th, 1917. Lieut. G. Harwood, Suff. R., S.R., and to be secd. ; Oct. 30th, 1917. Lieut. J. W. Young, R. Sco. Fus., S.R., and to be secd. ; Nov. 4th, 1917 ; Temp. 2nd Lieut. V. P. Feather, Gen. List ; Nov. 5th, 1917. 2nd Lieut. A. J. de L. Chopin, R.F.A. (T.F.), and to be secd. ; 2nd Lieut. A. E. Evans, E. Surr. R., and to be secd. ; Nov. 6th, 1917. Lieut. T. K. Burton, Sco. Rif., and to be secd. ; Nov. 8th, 1917. Lieut. J. F. P. Maclaren, Yeo. (T.F.), and to be secd. ; Lieut. J. B. Baldie, Yeo. (T.F.), and to be secd. ; Nov. 11th, 1917. Lieut. C. B. R. Macdonald, R.E. ; Nov. 15th, 1917. 2nd Lieut. (on prob.) B. Heath, S.R. ; Nov. 19th, 1917. Temp. Lieut. P. W. D. Thurley, A.S.C., and to be transfd. to R.F.C., Gen. List ; Nov. 21st, 1917. 2nd Lieut. D. O. MacNicol, R.W. Kent. R. (T.F.), and to be secd. ; Dec. 6th, 1917. 2nd Lieut. L. S. Last, R.F.A., S.R. ; Dec. 7th, 1917. Temp. Lieut. H. G. Davis, Welsh R., from a Flying Officer (Obs.), and to be transfd. to the R.F.C. Gen. List ; Dec. 8th, 1917, with seniority from Dec. 24th, 1916. Lieut. C. H. Harding, Som. L.I. (T.F.), and to be secd. ; Dec. 10th, 1917. Capt. G. Y. Tyrrell, E. Kent. R., S.R., and to be secd. ; Lieut. H. L. Despard, Yeo. (T.F.), from R. Scots Fus., and to be secd. ; Temp. Lieut. R. Whitehead, R.E. ; Dec. 12th, 1917. Capt. G. N. Wales, Welsh R. (T.F.), from A. Cyclist Corps ; Dec. 13th, 1917. 2nd Lieut. (Temp. Lieut.) C. G. Stewart, R. Sco. Fus., from a Flying Officer (Obs.) ; Jan. 10th, 1918, seniority Jan. 15th, 1917. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—G. A. Morgan ; Oct. 28th, 1917. H. I. J. Gibbs ; Oct. 30th, 1917. W. M. Thomas ; Nov. 1st, 1917. W. E. Le Feuvre ; Nov. 8th, 1917. P. J. T. Baddiley ; Nov. 15th, 1917.

Flying Officers (Observers).—Lieut. J. W. Mitchell, Yeo. (T.F.), and to be secd. ; July 30th, 1917, seniority May 30th, 1917. Capt. C. H. L. Coney, N. Staff. R., S.R., and to be secd. ; Capt. E. R. Williams, R. Canadian Exped, Force ; Lieut. H. E. Jones, R. Canadian Exped. Force ; Lieut. E. N. Baillon, Canadian Exped. Force ; Lieut. R. F. M. Taunton, Canadian Exped. Force ; Lieut. J. W. Blake, K.R.R.C., S.R., and to be secd. ; Temp. Lieut. W. R. McMenan, High. L.I., and to be transfd. to R.F.C. Gen. List ; Temp. Lieut. L. R. B. Spence, L'pool R., and to be transfd. to R.F.C. Gen. List ; 2nd Lieut. R. C. Mitchell, R. Sco. Fus., and to be secd. ; 2nd Lieut. H. W. Underhill, R.A., and to be secd. ; Nov. 5th, 1917, seniority June 23rd, 1917. Temp. 2nd Lieut. G. A. Binning, Gen. List ; Nov. 19th, 1917, seniority Aug. 17th, 1917. Lieut. A. J. Pick, Durh. L.I., S.R., and to be secd. ; Nov. 18th, 1917, seniority Aug. 19th, 1917. Temp. 2nd Lieut. J. R. English, attd. R. Highrs., and to be transfd. to R.F.C. Gen. List ; Nov. 19th, 1917, seniority Sept. 18th, 1917. Lieut. (Temp. Capt.) P. A. Smith, Durh. L.I., and to be secd. ; Nov. 11th, 1917, seniority Oct. 18th, 1917.

Equipment Officers, 3rd Class.—Temp. Lieut. H. D. Legge, Suff. R., and to be transfd. to R.F.C. Gen. List ; Sept. 4th, 1917. Temp. Lieut. J. L. P. Cort, A.S.C., and to be transfd. to R.F.C. Gen. List ; Jan. 16th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—W. W. Pritchard ; Aug. 13th, 1917. W. M. F. Sherwood ; Nov. 14th, 1917. G. B. Heintzman, F. S. Armbister, J. F. Hewitt, W. H. Lawrence, R. A. Leahy, L. J. Lipscomb, A. E. Allen, W. M. Clayton, D. Humphrey, H. N. Dorling, W. A. Mansfield, S. G. Tackaberry ; Dec. 12th, 1917. H. R. Soutter ; Dec. 26th, 1917. F. J. MacLennan ; Jan. 18th.

General List.—Temp. 2nd Lieut. C. Nevile relinquishes his commission on account of ill-health, and is granted hon. rank of 2nd Lieut. ; Feb. 7th. Sergt. L. G. S. Gadpaille, from R.F.C., to be Temp. 2nd Lieut. ; Jan. 28th. To be Temp. 2nd Lieuts. (on prob.) :—L. H. J. Bourchier, Sergt. F. S. Wainscot, from R.F.C. ; Jan. 21st. C. O. Bennett, R. D. Thompson, late 2nd Lieut., A.S.C. ; Jan. 25th. Temp. 2nd Lieut. V. G. Smith relinquishes his commission on account of ill-health ; Feb. 7th.

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The following appointments are made :—

Wing Commander.—Temp. Maj. H. A. Van Ryneveld, M.C., Gen. List, from a Squdn. Comdr., and to be Temp. Lieut.-Col. whilst so employed ; Nov. 12th, 1917.

Flight Commanders.—From Flying Officers, and to be Temp. Capts. whilst so employed :—2nd Lieut. H. E. Rydon, S.R. ; Jan. 19th. Lieut. N. C. Millman, S.R. ; Jan. 22nd.

Flying Officers.—Lieut. H. de W. Cunningham, Can. Exped. Force ; Nov. 16th, 1917. 2nd Lieut. R. Locke, Lond. R. (T.F.), and to be secd. ; Dec. 28th, 1917. Lieut. E. E. Macartney, R.G.A., S.R., from a Flying Officer (Obs.) ; Jan. 3rd, seniority from Aug. 26th, 1916. Lieut. E. T. Akrill-Jones, Notts. and Derby R., S.R., and to be secd. ; Jan. 7th. Temp. 2nd Lieut. T. R. Hatton, K.R.R.C., and to be transfd. to R.F.C., Gen. List ; Jan. 11th. Lieut. L. de S. Duke, Can. Exped. Force, from a Flying Officer (Obs.) ; Jan. 12th, seniority from Feb. 3rd, 1917. Lieut. W. R. W. Henderson, Can. Exped. Force ; Jan. 13th. Lieut. H. R. Herbert, Can. Exped. Force ; Jan. 14th. Temp. 2nd Lieut. R. Parkhouse, attd. S. Staff. R., and to be transfd. to R.F.C. Gen. List ; Jan. 16th. Lieut. T. E. Blears, Lan. Fus. (T.F.), and to be secd. ; Jan. 16th. Temp. 2nd Lieuts., Gen. List :—J. Reid ; Oct. 30th, 1917. J. E. N. Godrich, Nov. 6th, 1917. S. Withington ; Nov. 10th, 1917. E. J. Crichton, H. Bligh ; Nov. 13th, 1917. T. E. Huntley ; Nov. 16th, 1917. A. H. Love ; Nov. 20th, 1917. H. H. House ; Dec. 10th, 1917. H. Dean ; Jan. 12th. L. G. S. Gadpaille ; Jan. 28th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—W. F. Purvis ; Sept. 16th, 1917. G. W. Miller ; Oct. 19th, 1917. P. Murgatroyd ; Nov. 1st, 1917. E. G. S. Mortimer ; Nov. 28th, 1917. R. G. Lye ; Nov. 30th, 1917. H. N. Jennings, W. Munn, W. N. Porritt ; Dec. 5th, 1917. C. J. Guthrie ; Dec. 8th, 1917. J. A. Hesselden ; Dec. 12th, 1917. F. J. Livingstone, F. W. C. Davies, H. R. Hern ; Dec. 22nd, 1917. A. G. Hearnden ; Jan. 6th. H. S. Lewis ; Jan. 10th. L. H. Wrightmeyer, J. C. Nuttall, G. D. Rowden ; Jan. 11th. H. H. E. Holt ; Jan. 12th. J. E. Hobson, W. F. Russell, W. N. Plenderleith ; Jan. 13th. N. C. Dixie, L. Kent, G. P. McIntyre, W. P. Lancaster ; Jan. 14th. The appointment of Lieut. H. D. Cunningham, Canadian Cav., notified in the *Gazette* of Dec. 7th, 1917, is cancelled.

Flying Officers (Observers).—2nd Lieut. W. D. Harris, D. of Corn. L.I., S.R., seniority from Sept. 3rd, 1917, and to be secd. ; 2nd Lieut. R. C. D. Oliver, R. Berks. R., seniority from Sept. 4th, 1917, and to be secd. ; Lieut. F. A. Mawdsley, Manch. R. (T.F.), seniority from Oct. 11th, 1917, and to be secd. ; Lieut. A. E. Love, R.F.A., S.R., Jan. 9th, seniority from Nov. 6th, 1917. Jan. 8th, seniority from Nov. 12th, 1917 :—Temp. Lieut. W. A. Duncan, Hamps. R., and to be transfd. to R.F.C. Gen. List : Temp. 2nd Lieut. R. L. Green, K.R. Rif. C., and to be transfd. to R.F.C. Gen. List. ; 2nd Lieut. W. G. Hasler, Ches. R., S.R., and to be secd. ; Jan. 8th. Lieut. A. D. Keith, Canadian Exped. Force, seniority from Nov. 13th, 1917. Lieut. H. R. Kincaid, Canadian Exped. Force, seniority from Nov. 21st, 1917. Lieut. W. H. G. Heath, R.A., seniority

from Dec. 11th, 1917. Temp. 2nd Lieut. (on prob.) M. H. Picot, Gen. List, seniority from Sept. 19th, 1917, and to be confirmed in his rank; Jan. 8th.

Balloon Officers.—Temp. Lieut. E. F. D. Acland, Gen. List, from a Rly. Trans. Officer (graded as a Staff Lieut., 1st Class); Jan. 17th. Temp. 2nd Lieut. (on prob.) A. Y. Moncrieff, Gen. List, and to be confirmed in his rank; Jan. 18th.

Adjutants.—Lieut. (now Capt.) R. G. Mitchell, R. Scots, and to be Temp. Capt. (with pay and allowances as Lieut.) whilst so employed, from June 29th to Aug. 20th, 1917. The appointment of Capt. B. G. M. F. Nixon, Ind. Inf., notified in the *Gazette* of Dec. 11th, 1917, is post-dated to Oct. 22nd, 1917.

Equipment Officers, 1st Class.—2nd Lieut. (Temp. Lieut.) A. C. Blackmore, S.R., from the 2nd Class, and to be Temp. Capt. whilst so employed; Jan. 15th.

2nd Class.—Temp. 2nd Lieut. W. A. Winter, Gen. List, from the 3rd Class, and to be Temp. Lieut. whilst so employed; Jan. 15th.

3rd Class.—Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank:—L. V. Mackenzie; Nov. 9th, 1917. L. E. Parry, R. W. Hogg; Dec. 3rd, 1917. C. G. Whitmore; Dec. 5th, 1917. R. Q. Hamilton; Dec. 12th, 1917.

Schools of Instruction.—Schools of Military Aeronautics.

Examining Officer (Graded as an Equipment Officer, 1st Class).—Temp. Lieut. P. C. Hollingsworth, M.C., Gen. List, from an Asst. Instr. (graded as an Equipment Officer, 2nd Class) at a School of Mil. Aeronautics, and to be Temp. Capt. whilst so employed; Jan. 11th.

School of Technical Training.

Assistant Instructor (Graded as an Equipment Officer, 3rd Class).—2nd Lieut. A. E. Fincher-Brookes, S.R., an Equipment Officer, 3rd Class; Jan. 18th.

Company Commander (Graded as an Equipment Officer, 2nd Class).—Lieut. N. Macgregor, Arg. and Suth'd Highrs. (T.F.), a Flying Officer (Obs.); Sept. 24th, 1917.

General List.—Temp. 2nd Lieuts. to be Temp. Lieuts.:—P. R. Mallinson; July 1st, 1917. E. C. J. McCracken; Jan. 16th.

Supplementary to Regular Corps.—Lieut. D. R. Stitt resigns his commission; Feb. 8th.

London Gazette Supplement, February 8th.

Attached to Headquarter Units.

Brigadier Commander.—Capt. (Temp. Lieut.-Col.) R. R. Smith-Barry, R.F.C., S.R., from a Wing Comdr., and to be Temp. Brig.-Gen. whilst so employed; Jan. 27th.

The following appointments are made:—

Flight Commanders.—From Flying Officers, and to be Temp. Capt. whilst so employed:—Lieut. J. S. Ralston, M.C., Sco. Rif. (T.F.), Temp. 2nd Lieut. J. Phillips, Gen. List; Jan. 26th.

Flying Officers.—Temp. Lieut. J. H. Low, Sco. Rif., and to be transfd. to the R.F.C., Gen. List; Oct. 19th, 1917. Lieut. G. V. Stewart, R. Highrs., S.R., and to be secd.; Oct. 21st, 1917. Temp. Lieut. W. M. Ackery, R. Dub. Fus., and to be transfd. to R.F.C., Gen. List; Nov. 14th, 1917. Temp. 2nd Lieut. A. B. Shilstone, Gen. List; Nov. 18th, 1917. Lieut. A. Le G. Campbell, High. L.I., and to be secd.; Lieut. G. A. Ogg, R. Highrs. (T.F.), and to be secd.; Lieut. D. A. Davies, Wilts. R. (T.F.), and to be secd.; Nov. 20th, 1917. 2nd Lieut. (on prob.) F. M. Johnson, S.R.; Nov. 24th, 1917. Lieut. G. W. Lecomber, R. Welsh Fus. (T.F.), and to be secd.; Nov. 28th, 1917. Temp. 2nd Lieut. H. Faull, Gen. List, from a Flying Officer (Obs.), with seniority from Sept. 6th, 1916; Temp. 2nd Lieut. F. S. Maxwell, Gen. List; Nov. 29th, 1917. Lieut. R. I. P. Barker, A.S.C. (T.F.), and to be secd.; Lieut. H. M. Harris, R. Scots (T.F.); Nov. 30th, 1917. Lieut. R. Skelton, Durh. L.I. (T.F.); Dec. 1st, 1917. Temp. Lieut. C. H. Mather, Gen. List, from a Flying Officer (Obs.), with seniority from Sept. 6th, 1916; Temp. 2nd Lieut. J. R. Booth, Gen. List; Dec. 2nd, 1917. Temp. Lieut. H. F. Morrell, Br. W. Indies R.; Dec. 3rd, 1917. Lieut. J. M. Tidmarsh, W. Rid. R., and to be secd.; Temp. 2nd Lieut. H. P. Rasmussen, Gen. List; Dec. 4th, 1917. Lieut. C. A. Bell, R.F.A. (T.F.), and to be secd.; Jan. 7th. Lieut. (Temp. Capt.) J. E. Storey, S.R., from an Equipment Officer, 1st Class; Temp. 2nd Lieut. A. W. Keight, Shrops. L.I., and to be transfd. to R.F.C., Gen. List; Temp. Lieut. F. J. Batt, M.G. Corps, and to be transfd. to R.F.C. Gen. List; Jan. 11th. Temp. Capt. L. S. Ladd, A.S.C., and to be transfd. to R.F.C. Gen. List; Lieut. C. S. Hall, Canadian Exped. Force; Jan. 12th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank:—L. P. McHugh; Oct. 31st, 1917. R. D. Hamilton; Nov. 19th, 1917. H. C. Deeks; Nov. 27th, 1917. H. S. Robinson, J. F. Thompson; Dec. 5th, 1917. R. F. Overbury; Jan. 10th. A. Slack, J. M. Boyce, R. B. Tapp; Jan. 12th. J. E. F. Dell; Jan. 13th. A. L. A. Perry-Keene, S. V. Langton, A. H. R. Daniel, E. H. Oxley-Boyle; Jan. 14th. J. L. K. Gifford, E. I. Sutcliffe, J. Pitt; Jan. 15th. The appointment of Temp. 2nd Lieut. G. K. Runciman, notified in the *Gazette* of Jan. 9th, is antedated to Nov. 6th, 1917.

Flying Officers (Observers).—Jan. 10th.—2nd Lieut. L. V. Dell, Lond. R. (T.F.), seniority from Sept. 10th, 1917, and to be secd.; 2nd Lieut. G. K. Mappin, N. Staff. R., S.R., seniority from Oct. 16th, 1917; Jan. 12th.—Seniority from Oct. 25th, 1917:—Temp. Capt. J. R. Fasson, A.S.C., and to be transfd. to R.F.C., Gen. List; Temp. 2nd Lieut. A. Clayton, Notts. and Derby R., and to be transfd. to R.F.C. Gen List; Temp. 2nd Lieut. W. J. Matthews, Tank Corps, and to be transfd. to R.F.C. Gen. List; seniority Nov. 8th, 1917. Temp. Capt. L. Pell-Ilderton, A.S.C., and to be transfd. to R.F.C. Gen. List; Jan. 11th. Seniority Nov. 12th, 1917. Jan. 12th.—Seniority from Nov. 13th, 1917:—2nd Lieut. W. W. Jones, Lond. R. (T.F.), and to be secd.; Temp. 2nd Lieut. A. E. Lancashire, Lan. Fus., and to be transfd. to R.F.C., Gen. List; 2nd Lieut. R. S. Herring, Lond. R. (T.F.), and to be secd.; Jan. 10th, seniority Nov. 21st, 1917. Jan. 12th.—Temp. Lieut. L. C. Keen, A.S.C., seniority Nov. 29th, 1917, and to be transfd. to R.F.C. Gen. List; 2nd Lieut. R. A. Burnard, Lond. R. (T.F.), seniority Dec. 7th, 1917, and to be secd.; Lieut. L. G. Martin, Canadian Exped. Force, seniority Dec. 13th, 1917; Temp. 2nd Lieut. (on prob.) F. W. Helsby, Gen. List, seniority Nov. 13th, 1917, and to be confirmed in his rank. Jan. 13th:—2nd Lieut. P. W. Plant, Notts. and Derby R. (T.F.), seniority Sept. 23rd, 1917, and to be secd.; Temp. 2nd Lieut. J. L. Morgan, S. Wales Bord., seniority Oct. 10th, 1917, and to be transfd. to R.F.C. Gen. List. Seniority from Oct. 23rd, 1917:—Lieut. W. S. Aulton, A.S.C. (T.F.), and to be secd.; Lieut. R. Stonehouse, A.S.C. (T.F.), and to be secd. Seniority Nov. 4th, 1917:—Temp. Lieut. A. W. James, A.S.C., and to be transfd. to R.F.C. Gen. List; Lieut. W. S. McKenzie, N.Z. Exped. Force; Temp. 2nd Lieut. W. Strang, attd. Leic. R., seniority Nov. 11th, 1917, and to be transfd. to R.F.C. Gen. List; 2nd Lieut. S. L. Goulding, Suff. R. (T.F.), seniority Nov. 15th, 1917, and to be secd.; Temp. 2nd Lieut. D. W. Kent-Jones, R.E., seniority Dec. 5th, 1917; Temp. Lieut. S. C. Jackson, Manch. R., seniority Dec. 11th, 1917, and to be transfd. to R.F.C. Gen. List; Temp. 2nd Lieut. (on prob.) R. Critchley, Gen. List, seniority Oct. 23rd, 1917, and to be confirmed in his rank. Temp. 2nd Lieuts. (on prob.), Gen. List, seniority Nov. 11th, 1917, and to be confirmed in their rank:—F. N. Harrison, T. H. D. Silvers, N. T. Berrington.

Equipment Officers, 1st Class.—2nd Lieut. (Temp. Lieut.) D. A. Pearson, S.R., from the 2nd Class, and to be Temp. Capt. whilst so employed; Dec. 3rd, 1917. Temp. Capt. A. M. Lester, Middx. R., from an Adjt.; Jan. 19th.

3rd Class.—Temp. 2nd Lieut. J. H. Taylor, K.R.R.C., and to be transfd. to R.F.C. Gen. List; Dec. 15th, 1917. Temp. Lieut. C. Arkle, Gen. List, from a Flying Officer (Obs.); Jan. 5th. Temp. 2nd Lieuts. (on prob.) Gen. List, and to be confirmed in their rank:—C. Mansfield; Nov. 26th, 1917. G. Spurgin; Dec. 2nd, 1917. R. Bonsor, H. J. Burns; Jan. 1st. A. L. Cooke; Jan. 12th.

Schools of Instruction.—Schools of Military Aeronautics.

Examining Officers.—(Graded as a Flight Comdr.).—Temp. 2nd Lieut. F. H. Beer, Gen. List, a Flying Officer, and to be Temp. Capt. whilst so employed; Jan. 22nd. (Graded as an Equipment Officer, 1st Class).—Temp. 2nd Lieut. J. Morris, Gen. List, from an Examining Officer (graded as an Equipment Officer, 2nd Class) and to be Temp. Capt. whilst so employed; Jan. 5th.

Assistant Instructor.—(Graded as an Equipment Officer, 2nd Class).—Lieut. E. E. Macartney, R.G.A., S.R., ceases to hold his appointment, and resumes that of Flying Officer (Obs.); Oct. 7th, 1917.

Artillery and Infantry Co-operation School.

Chief Instructor.—(Graded as a Squadron Commander).—Capt. D. R. Gawler, M.C., R. Scots, S.R., a Flight Comdr., and to be Temp. Maj. whilst so employed; Dec. 1st, 1917.

General List.—Hon. Capt. C. B. Southey is as now described, and not as in the *Gazette* of Nov. 15th, 1917. Temp. 2nd Lieut. W. B. Rayner to be Temp. Lieut.; Jan. 7th. Temp. 2nd Lieut. S. F. Surtees resigns his commission; Feb. 9th. The Christian names of Temp. 2nd Lieut. James Harkens Adamson are as now described and not as in the *Gazette* of Nov. 28th, 1917. To be Temp. 2nd Lieuts. (on prob.):—J. Macbeath; Nov. 19th, 1917. H. C. Blachford, C. T. A. Hart, W. P. Williams; Nov. 26th, 1917. C. S. Hadley, J. E. Cade, R. D. Chisholm, H. M. Frederick, W. J. Fenton, J. E. C. Hammond, R. S. MacD. Salt, O. H. Shenstone, G. D. Thomas, J. G. Williams, H. L. Whitelaw; Dec. 10th, 1917. A. M. Carroll; Dec. 11th, 1917. Sergt. P. H. Hall, from A.S.C.; Jan. 3rd. 3rd Class Air Mech. D. P. Jessup, from R.F.C.; Pte. J. Piggott, from an Employment Coy.; Pte. E. L. Reynolds, from O.T.C.; 2nd Class Air Mech. T. G. Boyland, from R.F.C.; 2nd Class Air Mech. W. W. Brabner, from R.F.C.; Pte. G. Cockburn, from Lond. R. (T.F.); Flt. Sergt. W. A. Fowler, from R.F.C.; Cadet R. S. A. Noakes, from R.F.C.; L.-Corpl. J. A. Osborne, from Hamps. R.; Pte. A. R. Philcox, from O.T.C.; 1st Class Air Mech. (Actg. Corpl.) F. T. Russell, from R.F.C.; 1st Class Air Mech. (Actg. Cpl.) W. Stanton, from R.F.C.; Corpl. H. Stocks, from H.A.C. (T.F.); Sergt. A. T. Wells, from R.F.C.; Jan. 15th. Cadet W. T. A. Jacob, from R.F.C.; Actg. Sergt. Maj. S. Tew, from C. Gds.; Actg. Sgt. F. G. A. Terrill, from R.F.C.; Jan. 21st. Cadet N. Farson, from R.F.C.; Jan. 26th. Cadets to be Temp. 2nd Lieuts. (on prob.):—C. M. Barter, H. A. Bartlett, F. C. Bennett, W. R. Binch, J. B. Boyter, W. A. Brett, W. K. Buchan, J. Burton, D. S. Carrie, J. C. Child, C. H. E. Coles, F. Coleman, D. C. Collier, R. D. Connop, E. H. Cornes, P. Crumner, P. D. d'Albenas, R. W. Davis, W. H. S. Davis, A. Douglas, F. A. Douglas, J. Duncanson, F. C. Eldred, H. Eliott, C. Fletcher, J. H. Gardner, S. A. Garfath, E. C. Gordon, G. Gorrill, W. J. K. Graham, W. H. E. Graham, J. H. Guest, G. Hainsworth, W. Hall, F. Hargraves, F. N. Hargreaves, R. S. Herbert, J. G. Hojel, S. D. Horne, E. S. Housley, A. C. Irwin, F. James, P. W. Johnson, A. W. Johnston, S. H. F. Jones, S. Jones, J. G. Kenyon, G. V. Kitson, M. B. Lacey, H. Lancashire, H. Leadley, N. D. Lees, A. Lewis, W. Ling, H. G. Mackwood, R. W. Locheed, W. Lofts, T. J. Maloney, H. G. Marsay, J. P. McClelland, M. H. McErlean, E. McEvoy, R. Miller-Tait, G. R. Moffoot, A. Moore, L. L. Nelson, N. J. Nock, J. H. Norman, E. W. Norris, E. Q. Parr, E. C. Paton, T. H. W. Pearce, A. J. Prentice, H. F. Redmond, A. J. Robinson, D. Rodger, S. J. R. Smith, M. W. C. Ridgway, H. T. Rushton, J. J. B. Rutter, J. M. Russell, A. W. Sawyer, P. J. Shaw, E. Slinger, A. S. Smith, H. W. Smith, H. J. Smith, H. S. Smith, J. A. W. Smith, L. Smith, J. T. Sorley, D. Sparrow, C. L. Stewart, C. H. Swan, J. G. Symons, E. J. Taylor, L. E. Tatton, R. R. H. Taylor, E. C. Terry, F. Thornton, A. W. Timson, N. S. Todd, W. A. Todd, R. Tompson, A. D. Tomsett, C. W. Trimmell, J. Tyllyer, H. R. Vennard, H. Wagner, F. C. Walker, W. Whatmore, W. R. Whettell, R. A. Whitehead, A. V. W. Williams, G. W. Willis, V. D. Smith, D. Bradbury; Feb. 2nd.

Memoranda.—Temp. 2nd Lieut. D. McLellan, R.F.C. Gen. List, is transfd. to Gen. List; Dec. 17th, 1917.

To be Temporary Second Lieutenants.—Pte. W. D. Newton, R.F.C., whilst spec. empld.; Feb. 9th.

Supplementary to Regular Corps.—2nd Lieuts. resign their commissions:—N. A. Burritt, S. P. Waddell, V. A. Stewart, H. G. Gonthier; Feb. 9th.

London Gazette Supplement, February 9th.

Special Appointments.—(Graded for purposes of pay as a Staff Capt. whilst employed as a Brig. Signalling Officer, R.F.C.).—Capt. H. A. Porter, R.G.A. (T.F.), and to be secd.; Nov. 19th, 1917. Substituted for the notification under "Royal Flying Corps, Mil. Wing," in *Gazette* of Jan. 15th.

The following appointments are made:—

Staff Officers, 3rd Class.—(Graded as a G.S.O., 3rd Grade, at the War Office).—Temp. Capt. S. M. Wood, Gen. List, from a Staff Officer, 3rd Class (graded as a Staff Capt.), vice Maj. R. H. Howell, Ind. Cav. (Graded as a Staff Capt.).—Lieut. (Temp. Capt.) L. A. K. Butt, S. Staff. R., from an Adjutant, and to retain his temp. rank whilst so employed, vice Temp. Capt. S. M. Wood, Gen. List; Jan. 24th.

Flight Commanders.—From Flying Officers, and to be Temp. Capts. whilst so employed:—2nd Lieut. M. E. Gonne, R. Fus.; Jan. 9th. 2nd Lieut. W. L. Douglas, M.C., Lond. R. (T.F.); 2nd Lieut. J. A. Hutchison, S.R.; Jan. 11th. Lieut. F. N. Chadwick, Manch. R. (T.F.); 2nd Lieut. N. P. Dixon, S.R.; Jan. 16th.

Flying Officers.—Lieut. A. C. Bencher, Lond. R. (T.F.), and to be secd.; Dec. 12th, 1917. Temp. Lieut. B. H. Church, R.A., and to be transfd. to R.F.C. Gen. List; Temp. 2nd Lieut. V. C. Blackmore, attd. Dorset R., and to be transfd. to R.F.C. Gen. List; Dec. 14th, 1917. Temp. 2nd Lieut. (Actg. Capt.) T. D. Penrice, N. Lan. R., to relinquish his actg. rank, and to be transfd. to R.F.C. Gen. List; 2nd Lieut. E. P. H. Mitchell, Bord. R., and to be secd.; Temp. 2nd Lieut. J. W. Hart, attd. North'n R., and to be transfd. to R.F.C. Gen. List; Dec. 16th, 1917. 2nd Lieut. (Temp. Lieut.) G. M. Lees, M.C., R.A., from a Flying Officer (Obs.); Dec. 17th, 1917, seniority from Feb. 21st. 1917. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank:—S. Stanger; Sept. 24th, 1917. W. J. Walker; Nov. 9th, 1917. G. Davis; Dec. 13th, 1917. H. A. Walters; Dec. 16th, 1917. L. Roebuck, C. N. Haines, N. Midgley; Jan. 3rd. J. H. Jennings; Jan. 4th. A. Farthing; Jan. 6th. V. W. Kilroe; Jan. 7th. W. T. Chard, R. Ivelaw-Chapman; Jan. 11th. P. Blairman; Jan. 12th. R. Duncanson; Jan. 13th. H. R. Jones, T. W. Mansell, C. W. E. Browse, J. E. Sharp, A. C. Fraser; Jan. 15th. W. Bennett (now Temp. Lieut.) E. C. J. McCracken, J. K. S. Smith, W. Beer, R. R. Rowe, J. T. McKay, R. J. Smith, A. M. McTavish, G. J. Gunyon, A. W. Bennett, L. J. Forrest; Jan. 16th. A. Swinglehurst, C. V. Wheatley, C. M. Shilcock, L. H. Phinney; Jan. 17th.

Flying Officer (Observer).—The seniority of Temp. 2nd Lieut. W. A. Amor, Gen. List, is from Jan. 24th, 1917, and not as in *Gazette* of May 16th, 1917.

Park Commander.—Temp. Capt. J. D. Drysdale, Gen. List, from an Equipment Officer, 1st Class, and to be Temp. Maj. whilst so employed; Jan. 22nd.

Equipment Officers, 1st Class.—From the 2nd Class, and to be Temp. Capts. whilst so employed:—Temp. Lieut. B. W. M. Williams, Gen. List; Temp. Lieut. C. Rayner, Gen. List; Temp. Lieut. R. E. Cook, Gen. List; Jan. 1st. 2nd Lieut. (Temp. Lieut.) R. A. Hassard, S.R.; 2nd Lieut. (Temp. Lieut.) S. J. Vine, S.R.; Jan. 30th. 2nd Class.—From the 3rd Class:—Temp. Lieut. O. M. D. Bell, Gen. List; Temp. Lieut. O. W. de Putron, Gen. List; Jan. 1st. And to be Temp. Lieuts. whilst so employed: Temp. QrMr. and Hon. Capt. A. Herbert, Gen. List; 2nd Lieut. G. E. Osmond, S.R.; Temp. 2nd Lieut. H. S. Hollings, Gen. List; Temp. 2nd Lieut. L. C. Bygrave, Gen. List.

Schools of Instruction.—Schools of Military Aeronautics.

Special Appointment.—Graded as Sqdn. Comdr.—Lieut. (Temp. Lieut.-Col.) H. E. Chaney, Lan. Fus., from Comdt. of a School of Aerial Gunnery (graded

as a Depôt Comdr.), relinquishes his temp. rank and reverts to the rank of Temp. Maj. whilst so employed; Aug. 1st, 1917. Substituted for notification in *Gazette* of Aug. 25th, 1917.

General List.—Temp. 2nd Lieut. D. C. Faulds relinquishes his commission on account of ill-health contracted on active service, and is granted the hon. rank of 2nd Lieut.; Feb. 10th. C. M. Bevan, late Temp. 2nd Lieut., R. Fus., to be Temp. 2nd Lieut.; Dec. 28th, 1917. The following relinquish the rank of Temp. Capt. on ceasing to be employed as Adjutants:—Lieut. H. W. Eaton, R. Scots. (T.F.); Jan. 1st. Temp. 2nd Lieut. C. F. Jex, Gen. List; Jan. 17th. Temp. Lieut. C. S. Fulton, Gen. List, to be Temp. Capt. (without the pay or allowances of that rank) while actg. as Adjt.; Jan. 17th.

Memoranda.—Bt. Lieut.-Col. (Temp. Lieut.-Col.) W. D. Ingle, Middx. R., relinquishes his temp. rank on ceasing to command an R.F.C. Cadet Wing; Jan. 28th.

Supplementary to Regular Corps.—2nd Lieut. (on prob.) F. M. Johnson is confirmed in his rank.

London Gazette Supplement, February 11th.

The following appointments are made:—

Squadron Commander.—Temp. Capt. W. J. Tempest, D.S.O., M.C., Gen. List, from a Flight Comdr., and to be Temp. Maj. whilst so employed; Dec. 15th, 1917.

Flight Commanders.—From Flying Officers, and to be Temp. Capts. whilst so employed:—Temp. 2nd Lieut. J. S. Michie, M.C., Gen. List; Dec. 5th, 1917. Temp. 2nd Lieut. F. C. Gorringe, Gen. List; Jan. 13th. 2nd Lieut. L. Cummings, S.R.; Jan. 24th.

Flying Officers.—Temp. 2nd Lieut. H. J. Crampton, Gen. List; Nov. 20th, 1917. Temp. 2nd Lieut. (on prob.) B. de Salaberry, Gen. List, and to be confirmed in his rank; Nov. 24th, 1917.

Equipment Officers, 1st Class.—Capt. (Temp. Maj.) A. M. C. Scott, Lond. R. (T.F.), reverts from a Park Comdr., at his own request, and relinquishes his temp. rank; Jan. 29th, seniority from July 23rd, 1916. Lieut. F. M. I. Watts, Worc. R., from the 2nd Class, and to be Temp. Capt. whilst so employed; Jan. 23rd. 3rd Class.—2nd Lieut. H. W. McGowan, K.O.S.B. (T.F.), from a Flying Officer; Aug. 1st, 1917. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank:—R. V. Middlemost; Nov. 1st, 1917. A. E. Fallon; Nov. 12th, 1917.

Schools of Military Aeronautics.—Instructors.—(Graded as Equipment Officers, 1st Class).—And to be Temp. Capts. whilst so employed:—Temp. Lieut. F. H. Hawksford, Gen. List, from an Asst. Instr. (graded as an Equipment Officer, 2nd Class); Oct. 1st, 1917. Temp. Lieut. R. J. G. Temple, Gen. List, from an Asst. Instr. (graded as an Equipment Officer, 2nd Class); Dec. 1st, 1917.

Assistant Instructors.—(Graded as Equipment Officers, 2nd Class).—Substituted for the notification in *Gazette* of Sept. 22nd, 1917. Temp. Lieut. A. D. Broughton, Gen. List, a Flying Officer; Temp. Lieut. R. J. G. Temple, Gen. List, a Flying Officer (Obs.); Temp. 2nd Lieut. F. J. Martel, Gen. List, a Flying Officer, and to be Temp. Lieut. whilst so employed; May 26th, 1917.

School of Technical Training.—Instructor.—(Graded as an Equipment Officer, 1st Class).—Temp. Capt. M. O. Illingworth, Gen. List, an Equipment Officer, 1st Class; Jan. 21st.

Wireless School.—Assistant Commandant.—(Graded as a Park Comdr.)—Lieut. (Temp. Capt.) E. Powell, S.R., an Equipment Officer, 1st Class; Jan. 1st.

General List.—Temp. 2nd Lieut. (on prob.) J. F. W. Nicolson is confirmed in his rank:—Pnr. H. A. E. Gard, from R.E., to be Temp. 2nd Lieut.; Jan. 14th. To be Temp. 2nd Lieuts. (on prob.):—A. O. Collins, late 2nd Lieut., Ind. Army Res. of Off.; Dec. 11th, 1917. R. P. Coulter; Jan. 24th. G. W. C. Dawson, late Asst. Paymr., R.N.V.R.; Qrmr. and Hon. Maj. A. Beattie, ret. pay; Jan. 25th. W. F. Boyd; Jan. 28th.

Memorandum.—Temp. Sgt.-Maj. J. R. Gardiner to be 2nd Lieut. whilst serving with R.F.C.; Jan. 2nd.

Supplementary to Regular Corps.—2nd Lieuts. to be Lieuts.—E. J. Smyth; Sept. 18th, 1917. P. G. Emery; Jan. 1st. T. McC. Yarwood, J. A. Chown; Jan. 7th.

Aeronautical Inspection Department.

London Gazette Supplement, February 5th.

H. C. Smith to be Temp. Hon. Lieut. while employed as Asst. Inspr. Aeronautical Inspn. Dept.; Sept. 26th, 1917.

London Gazette Supplement, February 6th.

H. S. Porter to be Temp. Hon. Lieut. whilst employed as Asst. Inspr. Aeronautical Inspn. Dept.; Dec. 1st, 1917.

AIRCRAFT WORK AT THE FRONT.

OFFICIAL INFORMATION.

British.

General Headquarters, February 4th.

"On the 3rd inst. the weather was fine, but with considerable ground mist. Reconnaissances were carried out by our aeroplanes, and many hostile batteries were engaged by our artillery, with observation from the air. Nearly four and a half tons of bombs were dropped during the day on various targets, including the railway signals at Melle, Ingelmunster, and Lichtervelde. At night no operations were possible owing to the mist. In air fighting five hostile machines were brought down and five driven down out of control. One of our aeroplanes is missing."

Admiralty, February 4th.

"On February 3rd naval aircraft carried out a bombing raid on the enemy aerodrome at Houttave. Many bombs were dropped on objective. During the day, in the course of aerial fighting, one enemy aircraft was destroyed and two driven down out of control. Two of our machines have failed to return."

General Headquarters, February 5th.

"On the 4th inst. haze and mist continued to make visibility very bad, although the day was fine. Several successful reconnaissances were carried out by our aeroplanes, and hostile batteries were effectively engaged by artillery with observation from the air. Over 3 tons of bombs were dropped during the day on various targets, including hostile ammunition dumps, and many thousand rounds were fired at the enemy from machine-guns. On the night of the 4th-5th, over 1½ tons of bombs were dropped by us on a hostile aerodrome south-east of Cambrai and on Menin railway station. Five German machines were brought down in the course of the day in air fighting, and three others were driven down out of control. One of our machines is missing."

General Headquarters, February 6th.

"On the 5th inst. visibility was again indifferent, but a considerable amount of work was carried out by our aeroplanes in conjunction with the artillery, and many hostile batteries were successfully engaged. Several successful reconnaissances were completed, and nearly 5 tons of bombs were dropped on hostile railway stations and sidings and other targets. Hostile aircraft were rather more active. In the course of the fighting our aeroplanes brought down five German machines and drove down four others out of control. A German observation balloon was also brought down. Four of our aeroplanes are missing. On the night of the 5th-6th inst. our machines again bombed an aerodrome south-east of Cambrai, and also hostile billets, dropping 1½ tons of bombs. All our machines returned."

General Headquarters, February 7th.

"On the 6th inst. low clouds and mist impeded operations during the morning, but later in the day the weather improved. Several reconnaissances were carried out by our aeroplanes, and hostile batteries were engaged by our artillery with observation from the air. Over a ton of bombs were dropped by us on various targets behind the enemy's lines. Two hostile machines were brought down in air fighting. Two of our machines are missing."

War Office, February 7th.

"*Palestine Front.*—On February 3rd a successful raid was carried out by our air services on enemy camps in the vicinity of Miskeh (in the Plain of Sharon, 15 miles N.E. of Joppa). Forty-seven direct hits were observed. On February 4th, the raid was repeated against the same objectives, 1,900 lb. weight of bombs being dropped and 37 direct hits observed. All our machines returned safely, although subjected to anti-aircraft gun and machine-gun fire."

"*Mesopotamia.*—On January 31st one of our airmen brought down a Turkish aeroplane, which fell in flames near Khanikin. Rain has fallen during the past week."

General Headquarters, February 9th.

"On the 8th inst. low clouds and rain interfered with flying, but a few bombs were dropped by our aeroplanes on miscellaneous targets. One hostile machine was shot down in our lines by fire from the ground. On the night of the 8th-9th inst. our night-flying machines dropped bombs on hostile aerodromes and billets. All our machines returned."

War Office, February 9th.

"*Italian Front.*—Considerable aerial activity during the last week; 15 enemy aircraft were shot down, one driven down out of control, and one balloon burnt. We lost one machine. Hostile bombing of bomb areas at night continues."

General Headquarters, February 10th.

"Several successful reconnaissances were carried out by our aeroplanes on the 9th inst. in spite of low clouds, mist, and high winds. Hostile batteries were engaged effectively by our artillery with observation from the air, and nearly one ton of bombs was dropped by us on various targets. In air fighting, one hostile machine was driven down out of control. One of our machines is missing On the night of the 9th-10th inst., our night-bombing machines carried out a successful raid into Germany, although the weather was by no means good. Nearly a ton of bombs was dropped with very good results on the important railway junction and sidings at Courcelles-les-Metz, south-east of Metz. One of our bombing machines is missing."

General Headquarters, February 11th.

"On the 10th inst. the weather was again overcast, with a high wind, which interfered with flying. Several reconnaissances were carried out by our aeroplanes, and hostile batteries were successfully engaged by our artillery with aerial observation. A few bombs were dropped by us on various targets behind the enemy's lines. No combats took place.

French.

Paris, February 4th.

"During the period between January 21st and January 31st inclusive nine German aeroplanes were brought down by our pilots in air fights and four by the fire of our anti-aircraft artillery. In addition, during the same period 15 enemy aeroplanes, seriously damaged, were seen to fall out of control in their own lines."

"*Salonica.*—Greek airmen bombarded the railway station of Milotkovo in the Vardar Valley."

Paris, February 5th.

"On February 3rd, during the daytime, taking advantage of the fine weather, our chaser aeroplanes displayed successful activity. Real air battles were fought by our pilots against the German squadrons well over the German lines. Eight German machines were shot down as the result of these fights, and five others fell, seriously hit and probably destroyed."

Paris, February 6th.

"During yesterday one of our bombarding squadrons flew over Saarbrücken, dropping with complete success 3,610 kilogrammes of bombs on this important railway junction. Our squadrons were attacked by several groups of enemy aeroplanes, and, accepting battle, brought down three German machines. All our aeroplanes returned to their lines. It is confirmed that two enemy machines which were reported to be seriously damaged on February 3rd and 4th were actually brought down. This increases the number of machines brought down by our pilots on these two days to five and nine respectively."

Paris, February 7th.

"During yesterday morning an enemy machine was brought down by the fire of our anti-aircraft artillery.

"*Salonica.*—Two enemy machines were brought down, one by our artillery, the other in an aerial engagement."

Italian.

Rome, February 3rd.

"Moderate artillery activity from the Stelvio to the Piave, more remarkable along the lower reaches of the river; the enemy exploded some mines without success in the Pasubio area; patrol encounters took place on the hills to the north-east of Mt. Grappa.

"Favoured by the fine weather, our aerial activity against enemy military objective, was considerable, with effective co-operation of the seaplanes of our Navy. Our flights bombarded yesterday the points of concentration, and the road crossings in the lines of communication of the enemy on the Asiago Plateau; our bombing machines damaged last night works of the aerial cable line between Caldonazzo and Mt. Rovere.

"Eight hostile machines were brought down during yesterday. One of them was hit by anti-aircraft artillery near Marano (Val Lagarina, another fell fn the neighbourhood of Primolano, six more were shot down between Vittorio Veneto and Nervesa by British airmen, who set fire also to a captive balloon along the Piave."

Rome, February 4th.

"Our aircraft carried out intense bombing of the enemy's rear lines. The traffic on the railway lines east of the Piave was effectively disturbed last night by our airships operating with those of our Navy; all returned safely to their bases. The enemy airmen gave vent again to their mischievous impulses, bombarding Venice and other towns of the Venetian Plain, where the peaceful population is densest and the military objectives of least importance. Padua, Treviso, and Mestre were repeatedly attacked yesterday before dawn, and towards sunset and during last night. As usual, the greatest damage was caused to private property, and the largest number of casualties is reported amongst civilians; the civil hospital at Treviso was hit. Altogether there were eight killed and 10 wounded among the population; neither damage nor casualties are reported at Venice."

Rome, February 5th.

"Desultory and intermittent artillery actions and lively aerial activity along the whole front. During yesterday 13 enemy machines were shot down, five of them by our own airmen in the Val Stagna, and eight by British airmen between the Piave and the Livenza and east of the Montello. During the night our airships bombarded military transports on the Conegliano Casarsa railway line. Before dawn this morning Padua was attacked again by enemy airmen, who dropped bombs in the centre of the town, causing damage to the buildings and wounding a few persons."

Rome, February 6th.

"There was increased artillery activity in the area around the Brenta Narrows and along the Piave, and lively aerial activity on the whole front. Yesterday our own and British bombing flights attacked with good effect enemy troops in the vicinity of Primolano and the aviation ground of San Giacomo di Veglia respectively. A large fire was caused by our airships in the ammunition stores of San Stino di Livenza. Five hostile machines were brought down, two of them by our own and three by British aviators. Venice, Mestre, and Treviso were bombarded once again yesterday after sunset. Neither casualties nor damage are reported."

Rome, February 7th.

"From the Stelvio to the sea slight artillery activity; some patrol encounters between the Adige and the Brenta, and a few aerial combats, in the course of which British airmen shot down an enemy machine. Calviano (south-east of Brescia), Bassano, and again Treviso and Mestre were bombed early yesterday morning by hostile aircraft, causing little damage and a few casualties. One of our airships reached last night the aviation ground of S. Giacomo di Veglia (south-east of Vittorio), dropping 1 ton of high explosives. The number of hostile machines brought down from January 26th to the 6th inst. by our own and our Allies' airmen reached 56."

Rome, February 8th.

"During the night of the 6th-7th inst. one of our airships, after difficult navigation, reached the hostile aviation ground of Motta di Livenza, dropped one ton of explosives with very good results, and returned safely to her base."

Rome, February 10th.

"A strong squadron of seaplanes of our Navy bombarded, with very good results, the enemy's trenches and hutments at Revedoli (mouth of the Piave)."

Rome, February 11th.

"One of our airmen shot down two enemy aeroplanes; one of them fell to the north of Piovene, and the airmen were captured; the other was brought down in flames in the neighbourhood of Valli dei Signori.

"Seaplanes of the Royal Navy crossed the Adriatic and reached the coast of Dalmatia, flying over the channel and almost to the Sabbioncello Peninsula. They were the object of intense fire from anti-aircraft artillery, but they carried out with evident success a bombardment of the military works on the island of Curzola. The machines returned undamaged after a flight of about four hours."

Belgian. *Havre, February 3rd.*

"A German aeroplane was brought down in our lines by British airmen."

German. *Berlin, February 4th.*

"During the last two days 18 enemy aeroplanes and two captive balloons were brought down in aerial fights and by gun-fire."

Berlin, February 6th.

"Yesterday, seven enemy aeroplanes and one captive balloon were shot down. Lieut. Bongartz obtained his 29th aerial victory."

Berlin, February 7th.

"Sergt. Esswein has shot down six enemy aeroplanes during the last three days."

Turkish. *Constantinople, February 1st.*

"Of the five enemy aeroplanes which dropped bombs 'unsuccessfully' on Kifri one crashed down and was burnt."

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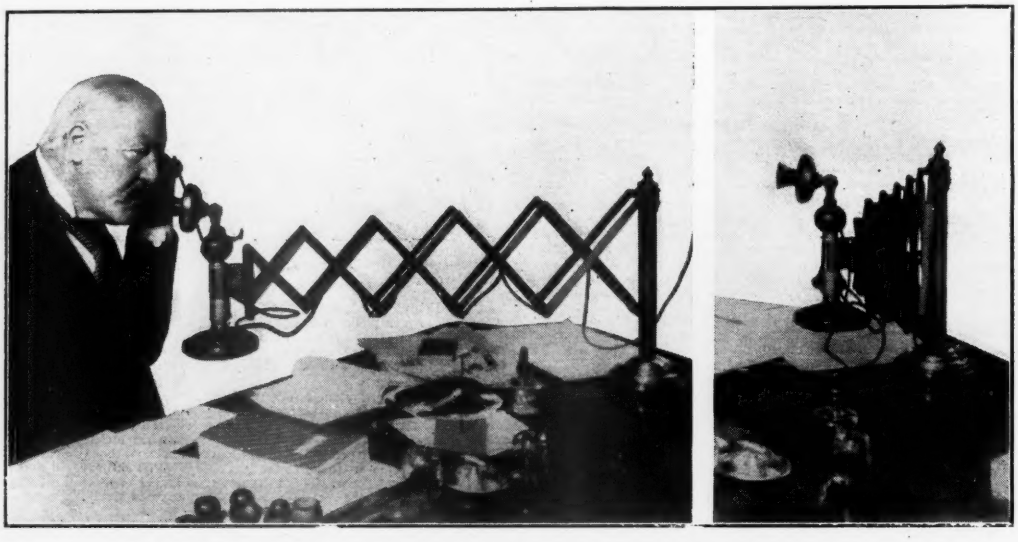
THE "LAZILITE" TELEPHONE ATTACHMENT.

TAKING its name from the lazy-tongs principle, which forms the basis of the idea, the "Lazilite" device is an invention which has no suggestion of laziness about it. On the other hand, whether applied to electric lighting, as illustrated in "FLIGHT" a week or so back, or used in connection with a telephone, it is both a time-saver and a convenience. One of our illustrations of the "Lazilite" telephone attachment shows the telephone in use, while in the other view it is seen in its closed position. Its advantages are obvious from these two views, and it is not surprising to hear that a large number are being installed in Government departments as well as in the offices of leading industrial concerns.



The "Lazilite" Telephone attachment, in use and "at rest."

It will be noticed that a substantial pillar, attached to the desk, carries the attachment, and this permits of the arm being swung in any direction, and at the same time the telephone is always clear of the desk, so that papers thereon are not disturbed in any way. When not in use, the telephone is still within easy reach—yet it is quite out of the way—and the only desk room which it takes up is the small circle occupied by the base of the pillar.

When the telephone bell rings, a very slight touch—owing to the way in which every part of the device is balanced—brings the telephone to a convenient speaking distance, and whatever movement is necessary to consult papers, the "Lazilite" easily and immediately adjusts itself. Whether standing or seated, you can speak through the telephone in comfort. When finished with, the merest push sends the telephone back to the closed position, out of the way until it is needed again.

The telephone attachment is made in three styles, either for screwing on to the table, as shown in the photograph, or for attachment to the side of a desk, or for fitting to the wall. The arm extends to 3 ft. 6 ins., so that the telephone can be used anywhere within a 7-ft. circle, and where, as is often the case, two people are sitting at opposite sides of a table it can be used by either with equal convenience and facility. It is substantially made and beautifully finished, and as there is nothing to get out of order, it is practically ever-lasting. The actual fitting is a most simple matter, and can be undertaken by anyone. At the same time the "Lazilite" Company, of 5, Baldwin's Gardens, Gray's Inn Road, E.C., will be pleased to place their experience at the disposal of anyone who is interested and has under consideration the question of installing the device.

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Inspection of Sub-Contracts.

HIS HONOUR JUDGE RENTOUL was called upon to decide an important point affecting contractors and sub-contractors in the City of London Court on February 7th.

The British Aluminium Co., Ltd., sued Messrs. Hardingham Bros., Battersea, for £3 4s. for aeroplane map frames. The frames were refused by the chief inspector at the defendants' works. Plaintiffs said they did not undertake to pass any other inspection than that by the man who came to their premises. The Judge found for the plaintiffs, with costs.

SIDE-WINDS.

THE Glendower Aircraft Company, Ltd., of 54, Sussex Place, write us that their attention has been called to the fact that a company bearing a somewhat similar name to their Company, viz., The Glendower Motor Company, Ltd., has recently passed a resolution to wind up, and they have received several inquiries as to whether they are the same company, or connected with it. The Glendower Aircraft Company, therefore, notify that they have no connection whatever with the company in question; that their business, which consists of the manufacture of aeroplanes, is being carried on as heretofore at Sussex Place and Queensbury Mews, South Kensington, and that they have now acquired 11 acres of land about three miles away from their present factory whereon they are erecting a large factory to cope with their increasing business.

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"SPECIALISATION" is a watchword which has spelt success for many firms, and among them must be included Messrs. Williams and Williams, Ltd., of the Reliance Stamping Works, Chester. Having had considerable experience in steel stampings in connection with their peace-time business of steel window frame making, &c., they decided to concentrate on this when the question of utilising their factory for war work arose. With commendable foresight the two brothers, Messrs. A. H. and B. A. Williams, realising the great demand which would arise for steel stampings and pressed steel parts for aeroplanes, laid their plans to specialise on this branch of the business and their faith has been justified. One serious problem, which fortunately was tackled early, was that of labour, many of the firm's skilled employees having joined up in the early days of the war. Steps were at once taken, however, to train women workers in increasing numbers, and so it has been possible to keep step with the steadily progressing demand which has been made upon both the old and the new works. One department in which the girls have proved particularly adept is that of welding, both by the electric and oxy-acetylene processes, which plays such an important part in the manufacture of aircraft fittings. The works also comprise a very well-equipped tool shop, and Messrs. Williams and Williams are fortunate in having a good reserve of material upon which to draw.

The headquarters of the firm was formerly a country mansion and in its transformation, besides providing excellent offices, ample accommodation was arranged for canteens and rest rooms. The surrounding grounds also provide good opportunities for recreation on the part of both male and female employees, a privilege which is greatly appreciated.

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CONSERVATION of tools is most important just now and lends added interest to a development in hardening which has been thought out by the inventor of Cobaltcrom steel. It has been found that Cobaltcrom steel tools treated by this method have considerably increased staying power; in one case it is stated that tests showed a 50 per cent. increase in efficiency. The process is simple, practically fool-proof, is carried out in one operation, and dispenses with normalising. Instead of taking tools from the muffle immediately the correct hardening temperature has been attained, the feature of the new treatment is that they should remain in the muffle and be subjected to a slightly falling heat prior to being exposed to natural air-cooling.

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An ingenious heat controlling device has been evolved which though the whole outfit only costs a few shillings, is claimed to be more effective and reliable for muffle heat checking than the most expensive pyrometer installation. The advantage of this device over the ordinary pyrometer system is that both the maximum heat and the falling heat referred to are accurately recorded in the zone of the muffle in which the tool is heated. The device consists of calibrated metallic salts named "Pyreks Heat Indicator Compound," which melt and solidify at definite temperatures, and which are used in combination with small spoon-shaped receptacles made from a patent non-scaling acid resisting and rapid heat conducting alloy (also invented by the originator of Cobaltcrom steel) called "Reactal." For hardening tools which have to retain keen cutting edges and are not subject to shock 1,000° C. "Pyreks" compound is used, and for tools which are subject to severe shock 900° C. "Pyreks" Compound is applied, these two temperatures being the correct treating heats for these classes of tools. "Pyreks" compound is also prepared and calibrated for other temperatures.

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THE actual method of carrying out the hardening process is as follows. The tool to be hardened in the muffle is first heated uniformly to a cherry red. The "Reactal" spoon containing the "Pyreks" compound is then inserted and placed on or alongside the tool. When the "Pyreks" compound becomes quite liquid the gas or blast is turned off, or, as an alternative, the tool, together with the "Reactal" spoon, is slightly withdrawn towards the cooler zone at the muffle opening. The "Pyreks" compound is then watched until it begins to re-solidify at which point the tool is taken from the muffle and exposed to still air completing the hardening operation. Shops not possessing a regular muffle can, we understand, adopt the system with equally satisfactory results by using a smith's hearth and making an improvised muffle by inserting in the cokes or coal either a tube closed up at one end or a small plumbago crucible.

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THE rigging staff of Messrs. C. G. Spencer and Sons, Ltd., did some good work in decorating the large Balloon Hall at Highbury Grove for the headquarters staff social and dance on February 9th, 1918, flags and balloons of different types being suspended from the roof and making quite a gay display.

Some 150 members of the staff and friends thoroughly appreciated the efforts of the committee—Misses Watson, Lewis, and Messrs. Rixon and Whiting, ably assisted by Misses Hayes, Blight, Richards, Coote, Mrs. McLean, and Mr. Mellor—and the programme of musical items and dances made the evening pass very quickly. Among those who lent valuable aid with the entertainment were Messrs. Rixon, Whiting, Smiles, Verrijdt, Bailey, Buton, Misses Vann, Rust, Rowley, Vicarey, "Sisters O'Neil," Masters, Richards, Richardson, McLean, Buller, Mann, while several numbers on the programme were contributed by members of the A.I.D. staff attached to the firm's various establishments.

Mr. T. Whiting and his lieutenant, Mr. Rixon, foreman of Highbury Grove Works, carried out the duties of M.C. most efficiently.

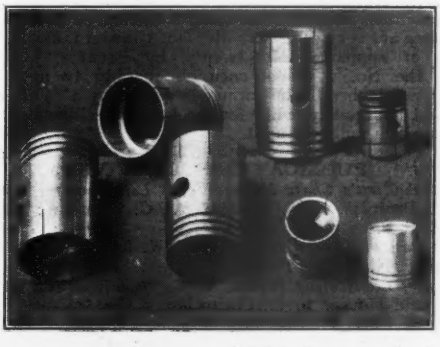
Among those present were the managing director, Mr. Ernest Allen, and secretary, Mr. Lewis Bryant. Mr. Dennison, A.I.D., proposed a hearty vote of thanks to the committee and artistes.

AN IMPROVED AEROLITE PISTON.

REDUCTION of oil consumption and elimination of piston "slap" are two claims which are made for the new Aerolite piston which, as will be seen from the photograph of a group of pistons of various sizes, is characterised by a split skirt. The skirt is turned to a slight taper so that it will not completely enter the cylinder; then this taper portion has a number of saw-cuts made in it, with the result that when pushed into the cylinder the natural spring of the metal makes this portion of the piston a close fit.

The utilisation of this idea is not confined to internal combustion engine work; as a matter of fact it has been applied with success to the plunger of air pumps used for maintaining the supply of petrol to aero engines. It can also be used on steel and cast iron pistons as well as those made of "Aerolite."

As to the merits of the new design on the score of oil consumption it is claimed that as the skirt of the piston acts as a scraper ring efficient lubrication is attained on a minimum consumption. It is stated that one test made on a car, which normally used 1 pint for 150 miles, showed that with Aerolite



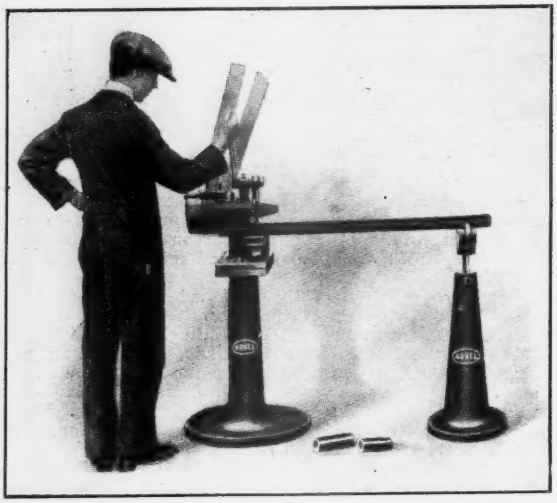
A group of improved Aerolite pistons.

pistons 1 pint was sufficient for 800 miles. By either increasing or decreasing the number of slots in the skirt the lubrication can be adjusted to any desired extent. This reduction in oil consumption means that there is a minimum of carbon deposit, allowing the engine to keep up to full power. At the same time the big ends can be liberally lubricated. It is stated that it is only necessary to make a rough adjustment of the oil supply; trough dip can vary from 2 to 6 mm. or in the case of forced feed a rough adjustment of the oil pressure is only necessary. In view of the reduction in the amount of fuel used it is possible to have only a small sump.

The Aerolite Piston Co., Ltd., Hanover Court Yard, Hanover Street London, W.1, who are introducing this new design, are willing to place their experience at the disposal of anyone wishing to carry out trials in comparison with pistons of the ordinary type.

THE "ARREL" PIPE-CUTTING MACHINE.

AMONG the many ingenious and practical tools sold by Messrs. Robert H. Lash, Ltd., of 29-31 Portugal Street, Kingsway, W.C. 2, one which should find a place in every works where tubes—whether iron, steel, brass or copper—are dealt with is the "Arrel" Pipe-cutting Machine. It is made in two sizes: No. 1 for dealing with pipes ranging from half an inch to three inches in diameter, and No. 2 for pipes from two inches to eight inches in diameter. Our illustration gives a good idea of the size and simplicity of operation of the No. 1 machine. The pipe is placed in position on the rests without setting or clamping and a slight pressure of the head lever as



The Arrel pipe cutting-off machine for cutting off iron, steel, brass and copper pipes.

shown feeds the circular knife into the pipe, the latter rotating as the cutting takes place. The high speed of the cutter results in a clean cut, and should there be a slight burr it can be speedily removed by the milling cutter supplied with each machine. An idea of the speediness of the machine can be obtained from the fact that a two-inch iron pipe can be cut in less than thirty seconds. Any length of pipe—down to the narrowest rings can be cut off, and either machine can deal with any diameter of pipe within its range of capacity. The machines are self-contained, requiring no counter-shaft, and they are very compact—the No. 1 model takes up a floor space of approximately twenty by twenty-eight inches, while the No. 2 model occupies roughly twenty-four by thirty-two inches. The former is driven by a $2\frac{1}{4}$ in. belt on an eight inch pulley, while for the larger machine a $2\frac{3}{4}$ in. belt on a 10-inch pulley is used.

PUBLICATIONS RECEIVED.

A Subaltern's Share in the War; Letters of the late Lieut. G. W. Devenish, R.A., attached R.F.C. London: Constable and Co. Price 3*s.* 6*d.* net.

Resistance of Air. By Lieut.-Col. R. de Villamil. London: E. and F. N. Spon. Price, 7*s.* 6*d.* net. Post free 8*s.*

Castrol Lubricating Index. C. C. Wakefield and Co., Ltd., Wakefield House, 30-32, Cheapside, E.C.2.

Liquid Fuels for Internal-Combustion Engines. By Harold Moore, M.Sc.Tech., F.C.S. London: Crosby Lockwood and Son. Price 12*s.* 6*d.* net.

COMPANY MATTERS.

Messrs. Mann, Egerton and Co., Ltd.

THE report of Mann, Egerton and Co., Ltd., for the financial year ending September 30th, 1917, shows a net trading profit of £37,956. After covering directors' and auditors' fees, income tax, interest, depreciations of land, buildings, and machinery, the usual dividends on the preference and ordinary shares will be paid. Liberal appropriations are made to reserve account, whilst a substantial amount is carried forward to 1917-8. The free reserves now stand at £28,000, while the item of "goodwill" appears in the accounts at the nominal figure of £5,000.

NEW COMPANIES REGISTERED.

AIRCRAFT AND PRODUCTION AUXILIARY ASSOCIATION, LTD.—Registered as a company limited by guarantee with 1,000 members, each liable for £2 in the event of winding up. Objects, to establish, maintain and conduct an association for assisting members in obtaining and carrying out Government and other contracts, to afford members all the usual advantages and centre of information and advice on the rights of, and all matters appertaining to, those engaged or interested in the aircraft and allied industries, to provide and maintain a suitable organisation for maintaining, protecting and enforcing the rights of those so engaged or interested, &c. Subscribers and temporary directors: A. J. Liversidge, Blin DesBleds, J. Grun, C. P. Fearnley, C. W. Hannam-Harris, F.I.S.A., J. F. Green, and A. E. Harrison. There is to be an Executive Committee of not more than 30 members exclusive of the secretary.

TUBES (EQUIPMENT) LTD.—Capital £1,000, in £1 shares. Manufacturers of and dealers in metal tubes, motors, aeroplanes, aircraft and cycle and motor parts, &c. First directors: J. H. Aston, A. Chamberlain, G. Beesley, A. E. Kirk, and J. Rollason.

BUSINESS NAMES REGISTRATIONS.

D. M. DAVIES AND CO.—Registered December 10th, 1917. Airscrew manufacturers and cabinet makers, 113, Cottenham Road, Holloway. Proprietor: D. M. Davies, (British) 1, Berkeley Road, Crouch End, Other business name: Falcon Airscrew Co.

Aeronautical Patents Published.

Applied for in 1916.

The numbers in brackets are those under which the specifications will be printed and abridged, &c

Published February 14th, 1918.

14,754. J. B. HENDERSON. Gyro-compasses. (112,636).
15,621. SOPWITH AVIATION CO. and T. SOPWITH. Adjustable seat for gunner on aeroplane. (112,641).

Applied for in 1917.

The number in brackets are those under which the specifications will be printed and abridged, &c.

Published February 14th, 1918.

2,036. R. O. BLAYNEY. Flying machines. (112,685).
2,122. A. J. LIVERSEDGE. Struts, &c., for aircraft. (112,688).
5,994. J. VEDRINES and L. L. ASTOUX. Aeroplane fuselages. (106,485).

If you require anything pertaining to aviation, study "FLIGHT'S" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages lxxviii, lxxix and lxxx).

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